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ABSTRACT

This report is one in a four-volume National Summary which presents existing workforce levels, training programs and career potentials for each of the states, Washington, D.C., Puerto Rico, and the Virgin Islands. Each individual state program summary is followed by a depiction of the current and projected (1976-1981) workforce figures for the environmental pollution control areas of air, noise, potable water, pesticides, radiation, solid waste, wastewater, and energy. An overview of selected environmental/energy education programs is also included. More detailed information may be found in the respective State or Regional volumes. This report includes the following states: Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, and South Carolina. (CS)

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ED147169

A National Environmental/Energy Workforce Assessment

NATIONAL SUMMARY

Volume Three
Nevada—South Carolina

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NATIONAL ENVIRONMENTAL/ENERGY

WORKFORCE ASSESSMENT

NATIONAL SUMMARY

Nevada-South Carolina

VOLUME THREE

Conducted by:

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INTRODUCTORY NOTE

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ACKNOWLEDGEMENT

The names of the federal, state and local agencies, groups and individuals who made this study possible through their patience and cooperation would be too numerous to mention. However, it must be pointed out that the information in these summaries and the other volumes of this study is a direct consequence of their participation. The research staff served largely as reporters and documenters of the facts and opinions they provided. In some instances, the authors supplied editorial commentary, but it was with the knowledge and understanding of the particular data source. Essentially, the study is theirs, from the landfill operator or the pesticide applicator to the state, regional or the federal administrator. Its relative degree of success will be a direct corollary of the credibility decision makers attach to the information furnished by those professionals working in the fields considered by this study.

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PREFACE

In reviewing these summaries, it should be pointed out that differences in the consistency of information is a reflection of several factors. To begin, for a number of states, figures were either not available at the time the field research was carried out or respondents were reluctant to provide estimates because of the tenuous nature of state and local program output reporting. In a majority of instances, these circumstances were a consequence of budgetary constraints imposed by state legislatures. Thus, state and local environmental control officials have been confronted with a situation where they must depend, in large measure, on federal funding programs to maintain minimal operational status, which is not always in compliance with federal mandates. Still, some states have been especially active in mounting environmental programs consonant with federal standards and uniquely suited to their particular problems. In these cases information is relatively complete and documented to be accurate.

Moreover, the presence or absence of workforce information may be said to be a measure of the individual state approach to the importance of environmental pollution control and abatement programs; the degree of support provided by state and local government; the support for program operation and maintenance provided by the federal government; and, the immediacy of environmental pollution problems in a given state or area.

Finally, though less quantifiable, but frequently voiced, program officials in several states were less than enthusiastic about participating in the assessment because they felt that little if any positive, substantive action would come of the effort. With this in mind, it is understandable that there would be occasional reluctance to "go the extra mile" in providing professional judgments regarding specific workforce figures or projections. Still, in the great majority of instances, program officials did go the extra mile as evidenced by their frequently unsolicited post-research interest in reviewing assessment outcomes.

All of the foregoing are indicators of what might be termed an inconsistency in the level of reporting. However, it is more nearly correct to assert, given the experience of the project, that these informational disparities as well as the converse informational completeness of many states are a reasonable and accurate representation of the state of the art across the nation. This can be exemplified by singling out states, for instance, which on one hand have no mandatory certification for water treatment plant operators or no legislation governing the amounts of pollutants emitted into the air, and comparing them with those which have comprehensive legislation and commensurate funding to support that legislation. These summaries, then, while they may present reasonable estimates of the national environmental/energy workforce situation, may do more to represent the problems of individual states with respect to meeting national standards, e.g., some cannot, some will not and some may not have a need or a desire for federal assistance.

In sum, these state briefs may be distilled down to a postulate which suggests too little consistent articulation of federal policy and too little continued support for maintenance of programs which are either stop-gap in their efforts to contain pollution or have questionable long-range cost or human benefit.

FOREWORD

This report contains the state summaries of the National Environmental/Energy Workforce Assessment conducted for the United States Environmental Protection Agency by the National Field Research Center of Iowa City, Iowa. Each individual state program summary is followed by a depiction of the current and projected (1976-1981) workforce figures for the following areas:

AIR
NOISE
PESTICIDES
POTABLE WATER
RADIATION
SOLID WASTE
WASTE WATER
ENERGY

An overview of selected environmental/energy education programs has also been included. These programs do not necessarily represent the entire spectrum of available opportunities, but rather a sample of those significant, well-defined offerings which address the workforce needs of the disciplines outlined above.

More detailed information regarding the workforce assessment is to be found in the respective State or Regional volume of the study.

National Environmental Energy Workforce Assessment

Phase I

NEVADA

State Summary

I. AIR

The Air Quality Section of the Environmental Protection Services (EPS) within the Department of Human Resources has primary responsibility for the state air pollution control and abatement program. Local air pollution authorities in Clark and Washoe Counties are handled through the District Health Department.

Public air pollution control workforce activity involves 22 professional staff. They consist mainly of engineers, scientists, and technicians. Industry employs another estimated 15 people.

The EPS Air Section expects to employ an additional eight persons over the next five years. Specific workforce projections for industrial and municipal air pollution control authorities were not available, although more stringent enforcement of existing regulations and the possible development of additional air quality standards is expected to necessitate workforce increases in both municipal and industrial air pollution abatement areas. Personnel required would include technicians, scientists, engineers, and meteorologists.

While there are no formal training programs, EPS staff have received supervisory training, first-aid training, quality assurance training, and fire fighting training. Occasional seminars, such as stack sampling, are also held for staff enrichment.

There is also a proposed auto inspection program which, if funded, could create the need for 12 additional staff over the next five years.

II. NOISE

The noise abatement activities are considered a low priority program at the present time. OSHA noise regulations are enforced by the Industrial Commission Occupational Safety and Health Board (ICOSHB). On the municipal level, enforcement is the responsibility of local law personnel, and enforcement occurs on a nuisance complaint basis for the most part.

Currently Las Vegas is the only city in Nevada which has municipal noise ordinances. They include areas of nuisance, vehicles, and zoning. There are also various statewide restrictions pertaining to motor vehicle, motorcycle, and off-road recreational vehicle sound level limits.

A part-time noise control workforce of thirteen professionals is estimated by ICOSHB sources for maintaining statewide noise abatement activities. They include two administrators, two industrial hygienists, and nine safety and health specialists who regularly do health compliance monitoring in several areas in addition to noise.

No increase is expected in the workforce in the compliance monitoring of OSHA regulations. However, the implementation of EPA's national program strategy to abate noise may create an abundance of activity at the state and local levels. Their approach to state and local communities will be implemented when additional personnel resources become available to the noise program, hopefully, in October, 1977.

III. PESTICIDES

The Nevada Department of Agriculture, Division of Plant Industry, is the prime authority for the control and abatement of pesticide misuse and pollution. Departmental program efforts are supported through cooperative agreements with the University of Nevada and a cooperative enforcement agreement with the EPA.

There are seventeen professional administrative and field positions within the Division dealing with pesticides. In the private sector there are an estimated 963 certified commercial and private pesticide applicators.

No increases in Departmental staff are expected over the next five years. However, within that time, commercial and private pesticide applicator personnel are estimated to increase by 500, providing a workforce of close to 1,400 applicators certified to handle restricted-use pesticides.

The Department, in cooperation with the University of Nevada Extension Service, provides a pesticide applicator training program. It was attended by approximately 1,030 persons during the last two years and covered twenty topics dealing with pest control.

Future employment will be limited, but may increase with regulatory responsibilities mandated through federal programs involving the Toxic Substances Control Act. Future career opportunities will include areas of hazardous waste disposal, pesticide inspection, and research activities in integrated pest management.

IV. POTABLE WATER

Administration of Nevada's requirements pertaining to drinking water is vested in the State Department of Human Resources, Division of Health, with assistance by the Clark and Washoe County Health Districts. Currently there are five people allocated to the drinking water supervision program. These people are engineers and inspectors whose duties include site inspections, water system plans approval, water quality analysis, and regulation enforcement. An increase of eight persons is expected over the next five years which will reflect the increased workload developed through state primacy acceptance of the Safe Drinking Water Act.

The number of personnel involved in municipal water treatment is difficult to ascertain as a water treatment operator certification program is yet to be established. But, it is estimated to involve approximately 100 people. Little or no growth is projected for this workforce.

While there are no formal training programs presently operating, the Department does provide on-site training in conjunction with their site inspection activities on an irregular basis. If mandatory certification is realized, training will be formalized to be in compliance with state regulations.

Career opportunities are expected to be limited in this area although acceptance concerning primacy of the Safe Drinking Water Act may influence growth activity.

V. RADIATION

The Radiological Health Section of the Department of Health and Welfare has regulatory responsibility for statewide radiation control. They do, however, operate in an agreement state with the U.S. Nuclear Regulatory Commission.

The staff of the Health Section consists of two professionals who are radiological health physicists with extensive field experience. One additional person may be added within the next five years whose duties would support monitoring, registration, and licensing activity.

Private sector workforce activity is based on information contained in ERDA Publication #78 entitled An Analysis of Nuclear Related Technician Manpower in Western States due to unavailability of information from private sector sources. As of the first of January, 1975, there were 94 radiation control technicians in Nevada. This number is expected to increase by an additional 60 by 1977.

Some training is available through ERDA seminars and courses offered by the Nuclear Regulatory Commission.

As dependence on nuclear power production increases, and research and development activity expands, many good career opportunities will be developed. Sources in the field have indicated that jobs will become available for highly trained engineers and health physicists as well as for technicians, maintenance, and labor personnel. The majority of these positions are expected to develop at the private industry level as radiation becomes a more widely used technological tool.

VI. SOLID WASTE

The Department of Human Resources has been designated as the state agency responsible for the administration of all regulatory functions set forth in the Solid Waste Disposal Act.

In support of the Department's regulatory activities, the State Environmental Commission has been delegated authority to develop a statewide solid waste management system in cooperation with the governing bodies of existing municipalities.

At the present time, three sanitary engineers provide full-time solid waste management and enforcement capabilities for the Department.

Investigations and inspections of solid waste disposal systems are carried out by personnel under contract through the Bureau of Consumer Health Services. This workforce is used on a part-time basis and involves nine inspectors with degrees in the biological science field.

Private sector workforce activity is estimated to involve 56 persons in disposal and 250 persons in collection.

It has been suggested by professionals in the field, that as a result of more stringent regulation enforcement and possible increased responsibilities mandated by the Resource Conservation and Recovery Act, a probable increase of four staff members will occur over the next five years. Private sector projections indicate a 7 percent per annum growth in disposal personnel and a 10 percent per annum growth in collection.

VII. WASTE WATER

The Department of Human Resources has been designated as the state water pollution control agency for all purposes of federal water pollution control legislation. The State Environmental Commission provides the one exception to this in that the Commission has the exclusive power to promulgate rules and regulations concerning water pollution control.

Departmental waste water workforce staffing involves seven professional personnel. They include engineers, scientists, and planners.

At the present time, the private sector workforce involves 66 waste water treatment plant operators.

Workforce projections indicate a growth in public sector staffing by three positions over the next five years. Private sector workforce increases are anticipated to involve the addition of 59 certified waste water treatment plant operators. These additional operators are expected to be needed as new facility construction continues and upgrade of existing facilities becomes necessary. Although certification of waste water operator personnel is conducted on a voluntary basis, training in the future is anticipated to become an important component in the effort to eliminate waste water pollution in Nevada.

VIII. ENERGY

Through the Nevada state legislative process, two principal agencies have been assigned responsibilities concerning energy management. The Energy Management Division of the Public Service Commission and the Energy Resources Advisory Board jointly provide recommendations concerning energy resources, conservation and efficient utilization.

A specific full-time energy management workforce does not appear to exist as an entity of its own at this point in time. However, there have been approximately 20 appointed positions developed through legislation involving the Energy Management Division and the Energy Resources Advisory Board.

Due to the part-time nature of the existing positions, no workforce increases are expected to develop in the next five years. If full-time employment in this area does develop, it is expected to be extremely dependent on federal funding.

The Energy Resources Advisory Board is responsible for providing recommendations concerning appropriate legislation and regulations to promote the conservation and economical utilization of energy resources and supplies. At the present time no formalized training programs are operational; however, the development of a public oriented educational program to promote conservation and proper utilization of energy resources is expected to develop within the next five years.

STATE OF NEVADA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	7	9	11	13	15	15	17%
NOISE[2]	0	0	0	0	0	0	n/a
PESTICIDES[3]	17	17	17	17	17	17	0%
POTABLE WATER[4]	105	106	108	111	112	113	1%
RADIATION[5]	2	2	3	3	3	3	10%
SOLID WASTE[6]	317	349	380	417	460	496	9%
WASTEWATER[7]	76	87	99	114	128	138	13%
ENERGY[8]	0	0	0	0	0	0	0%
TOTAL	524	570	618	675	735	782	8%

[1]The above does not include 15 municipal and 15 industrial personnel for which projections were not available.

[2]The above does not include part-time ICOSHB personnel for which projections were not available.

[3]The above does not include 963 pesticide applicator personnel for which projections were not available.

[4]The above includes 100 water supply treatment plant operators.

[5]The above does not include 123 radiation control technicians in the private sector for which projections were not available.

[6]The above includes regulatory, disposal, and collection personnel.

[7]The above includes both public and private sector personnel.

[8]The above does not include part-time appointed Advisory Board positions.

EDUCATION

The higher education system of Nevada has not developed a strong environmental program, per se, to date. Most of the offerings are environmentally related courses within individual disciplines. This is partially due to the absence of a strong demand for consolidation of courses under one department, in conjunction with limited financial resources for program development.

The majority of Nevada's higher institutions fall within the University of Nevada System. This consists of three community colleges and two universities, one at Reno and one at Las Vegas.

The three community colleges offer several environmentally related courses. The following is a partial list of courses that have been developed, although they are not necessarily taught every term nor are they all available at all campuses.

Man and Environment
Man and Climate
Wilderness Survival
Energy: Current Problems and Solutions
Introduction to Environmental Planning
Applied Climatology
Air Pollution Techniques and Problems
Ecological Principles for Economic Development

The University of Nevada, Reno, offers environmentally related courses through the interdisciplinary area. These include such courses as "Man and Environment," Community Environmental Planning," "Lifestyles and the Environment," and "Seminar on Lifestyles and the Environment."

LEGISLATION

The environmental/energy legislation for Nevada was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Pollution Control Act

Custom Application of Pesticides Law

Solid Waste Disposal Law

Water Pollution Control Law

Energy Management Law

Energy Resources Advisory Board

National Environmental Energy Workforce Assessment

Phase I

NEW HAMPSHIRE

State Summary

I. AIR

The State Air Pollution Control Agency of the New Hampshire Department of Health and Welfare is composed of engineers, technicians, chemists, and meteorologists. Professionals within the State Air Pollution Control Agency expect to acquire no additional personnel over the next two years or even by 1981. Sources at the Control Agency point out that at very least, five to nine additional technical and professional air pollution control personnel are needed to conduct in-house and field enforcement activities.

Those persons who are likely to find positions in the air pollution control field will continue to be degreed engineers and scientists as well as technicians who are knowledgeable in combustion, measurement, and instrumentation.

The New Hampshire Air Pollution Control Agency is in need of additional technical and professional personnel to ensure the successful completion and maintenance of its air implementation plan. Currently, 21 individuals are charged with all responsibilities of ensuring total compliance with regulations promulgated under the Clean Air Act; however, it has been suggested that an adequate workforce should be in the range of 27-30 full-time employees.

II. NOISE

Within the State of New Hampshire the Air Pollution Control Agency has been designated as the principal contact for all noise-related matters. Since there is no legislative mandate within the state, a formal program does not exist. Currently less than one person-year is devoted to noise problems. Those complaints that do develop are generally referred to the state attorney general's office which acts as an arbitrator, with the Air Pollution Control Agency providing various consultant services if necessary.

Additionally, the New Hampshire Department of Transportation regulates off-road vehicle sound limits as well as sound limits generated by snowmobiles. The time devoted to this activity by this agency is also considered minimal. Finally, at the local level several towns in the state have developed municipal noise ordinances which together serve about 18 percent of the state's entire population. These are strictly nuisance laws and possess no acoustical criteria for regulation.

III. PESTICIDES

The pesticide program of New Hampshire's Department of Agriculture (NHDOA) is responsible for the implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) as amended. The program has recently been concerned with the development and implementation of a state plan to certify all commercial and private applicators in the state, in conjunction with the New Hampshire Cooperative Extension Service.

The Pesticide Control Division currently employs two professionals, a field inspector, and clerk typist. There were an estimated 250 certified commercial and 500 private applicators in New Hampshire in 1975.

Currently, these is a request to the State Legislature for authorization of additional field personnel to comply with increased responsibilities under FIFRA. Growth within the next five years will result in the addition of four to five field inspectors to monitor all application and distribution activities associated with EPA's restricted-use list. It is estimated that 750 commercial and 900 private applicators will have undergone training and certification as required under FIFRA by October 1977.

IV. POTABLE WATER

The water supply program of the state of New Hampshire is in the New Hampshire Water Supply and Pollution Control Commission. At this time, the state has every intention of accepting all delegations of authority under the Safe Drinking Water Act (SDWA) of 1974, and state legislation is being developed and upgraded to satisfy all primacy requirements. Priorities for ensuing years will be directed towards ensuring that New Hampshire successfully accepts primacy for implementing the provisions and regulations of SDWA.

The water supply program has responsibilities in regulating both the state's drinking water and its municipal wastewater facilities. It is composed of sanitary engineers, inspectors, sanitarians, a chemist and an accountant. Additionally, the water supply program calls upon the services of the Laboratory Committee, which is also located within the Commission. It is composed of five laboratory scientists, two laboratory assistants, and a technician.

No increases in state funding for the water supply program are anticipated. It has been suggested that the potential addition of two positions will be utilized for community system compliance with regulations promulgated under SDWA pursuant to the state's acceptance of primacy.

V. RADIATION

The New Hampshire State Radiation Control Agency, which is administered by a director of the State Air Pollution Control Agency, both within the New Hampshire Department of Health and Welfare, is responsible for implementing statewide plans to control and limit the uses of both ionizing and non-ionizing radiation.

The Radiation Control Agency is staffed by a program administrator, a radiological health director, and a radiological health specialist. Less than one half person-year is devoted to environmental radiation monitoring.

The New Hampshire radiation control program has remained at a constant workforce level for the past five years and it is expected that over the next five years the situation concerning staffing will remain constant. The program could effectively utilize the assistance of an additional professional to supplement current activities in environmental radiation control. This person would likely be a radiological health specialist. Training for the agency's three employees is extensive since the state has obtained agreement-state status with the U.S. Nuclear Regulatory Commission. Thus, employees may attend the numerous continuing education courses free of charge.

VI. SOLID WASTE

The Bureau of Solid Waste Management in the State of New Hampshire is located in the Division of Public Services within the Department of Health and Welfare. Currently, New Hampshire laws require every municipality to provide and maintain a sanitary landfill facility for refuse generated by its citizens. The sites are approved by the Bureau and a community must satisfy extensive testing requirements prior to site approval to ensure preservation of existing potable and surface waters.

The Bureau of Solid Waste Management is currently staffed by five individuals who have civil engineering, scientific, and clerical backgrounds. The program also relies upon the New Hampshire State Laboratory for laboratory analysis of leachates as well as soil samples and water quality samples.

With the passage of the Resource Conservation and Recovery Act of 1976, New Hampshire has determined that it will supplement its current program staff with two or three more professionals over the next five year period pursuant to appropriate federal funding. These individuals likely will have field experience and, in particular, will possess an intimate knowledge of hazardous wastes, their collection, transportation, storage, and ultimate disposal.

VII. WASTEWATER

The New Hampshire Water Supply and Pollution Control Commission has management of wastewater facilities responsibilities. The wastewater program of the Commission is staffed with sanitary, civil, public works, and soils engineers. It also employs aquatic biologists, laboratory scientists, sanitarians and technicians. Approximately 70-85 person-years are spent on federal wastewater programs under PL 92-500 (Water Pollution Control Act).

Most sanitary and civil engineers employed by the Commission are registered professional engineers and hold at least a master's degree. Program professionals have indicated that at least one environmental engineer, one soil scientist, and one public health specialist would be acquired by the program in the immediate future (1977).

At the local level, it is anticipated that the operator workforce would have approximately 30 new entries per annum. The potential for operator careers appears promising due to the growth of new wastewater plants.

VIII. ENERGY

New Hampshire has turned to nuclear power as a possible solution to its energy problem. Public Service of New Hampshire has one unit under construction and another unit under review to be located at Seabrook. The first is scheduled for completion in 1981 or 1982, and the second in 1983 or 1984.

The Governor's Council on Energy was created by executive order in June of 1973 to develop programs regarding distribution and consumption of fuel and energy. It administers the fuel allocation program and has compiled data sources for use in supply/demand projections for the New England Energy Management Information System.

STATE OF NEW HAMPSHIRE - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	21	21	21	--	--	--	N/A
NOISE[2]	2	2	2	2	2	2	0%
PESTICIDES[3]	4	--	--	--	--	9	N/A
POTABLE WATER[4]	781	--	--	--	--	--	N/A
RADIATION[5]	3	3	3	3	3	3	0%
SOLID WASTE[6]	5	--	--	--	--	--	N/A
WASTEWATER[7]	107	(110)	(110)	--	--	--	N/A
ENERGY[8]	--	--	--	--	--	--	N/A
TOTALS	923	--	--	--	--	--	N/A

[1]The above includes state agency personnel only. The private and local sector effort although not accurately identifiable is thought to be limited.

[2]The above represents 1 individual from the state Air Pollution Control Commission and 1 representative from the Attorney General's Office.

[3]The above represents state agency personnel only. As of December 1975, 750 pesticide applicators had been licensed in the state. By October 1977, it has been estimated that this workforce will increase to a level of 1650.

[4]The above depicts 21 state agency personnel and an estimated 760 individuals possessing varying degrees of local water supply responsibilities.

[5]The above reflects state agency personnel only.

[6]The above includes only state agency personnel.

[7]The above reflects only state agency personnel.

[8]No available data.

EDUCATION

There are several colleges and universities in New Hampshire which offer programs in environmental science and pollution control technology. Information on these programs was gathered from college catalogues selected on the basis of recommendations by professionals in the field, and phone calls to department heads. Only a small percentage of the schools in the state were included in our sample; thus, the programs outlined in this section simply represent the kinds of pollution control training available in the state at the two year, four year, and post graduate college levels. These programs are designed to prepare students for technical or professional positions in pollution control and related areas.

Included in this section are New England College, which offers a bachelor of science degree in Environmental Studies; New Hampshire Vocational Technical College, which offers an associate in science degree in Natural Resource Management; and Dartmouth College, which offers an academic emphasis in Environmental Studies.

LEGISLATION

The environmental/energy legislation for New Hampshire was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Pollution Control Law

Pesticides Control Act

Radiation Protection and Control Law

Laws Relating to Solid Waste Disposal

Motor Vehicle Junkyards Law

Oil Spillage in Public Waters Law

Water Pollution Control Law

National Environmental Energy
Workforce Assessment

Phase I

NEW JERSEY

State Summary

I. AIR

The Bureau of Air Pollution Control of the Division of Environmental Quality has a staffing level of 175 persons at present. They are grouped into four occupational categories. The largest category is scientists which is composed chiefly of environmental specialists. Program officials indicate that most of the environmental specialists have degrees in biology. The engineer category is composed of environmental engineers. The technicians are environmental and electronic technicians who do not require a college degree.

Program officials indicate that staffing levels can be expected to increase to approximately 221 persons, or a five percent increase per year over the next five years. Program officials expressed a definite need for increases in work-force, especially in planning activities. The greatest opportunity will still exist for environmental specialists; however, significant opportunities for engineers and technicians are also expected to develop. Only minimal growth in the program is anticipated over the next five years, thus delimiting career potential.

II. NOISE

The New Jersey Office of Noise Control is located within the Division of Environmental Quality in the State's Department of Environmental Protection (DEP). The Office is responsible for the enforcement of rules to control community noise emanating from industrial and commercial sources. DEP's authority in control covers all environmental noise problems, which includes industrial establishments.

The New Jersey Noise Control Act of 1971 authorizes the state to promulgate and enforce codes, rules, and regulations to control and abate noise. The only regulations thus far are those setting standards for industrial and commercial operations. The State Noise Control Act also specifies that ordinances and laws of local governments which are not consistent with the state regulations would not be superceded.

The Noise Control Council, within DEP, consists of 13 members of various state agencies and nine members appointed by the Governor to include a medical doctor, an industrialist, an ecologist, a civil engineer, and a member of a local governing body.

Five persons currently work on the noise control program which continues to exist although the Office of Noise Control no longer exists in the state budget. Personnel assigned to the Division of Environmental Quality employed by the noise control program include one engineer, one scientist, one technician, and two clerks. The program is expected to acquire approximately 18 new positions over the next five years.

III. PESTICIDES

New Jersey's pesticide program is the responsibility of the Office of Pesticide Control within the Division of Environmental Quality of the Department of Environmental Protection (DEP). The Office controls the administration, labeling, use, transportation, storage, sale, and disposal of pesticides and pesticide products.

The current staffing level of the state's pesticide program consists of ten people classified as scientists, technicians, and laboratory technicians. Scientists have degrees in environmental science, biology, or chemistry, and those holding technician positions perform field inspection activities.

Program officials in the Office of Pesticide Control have indicated that an immediate need exists for five additional people. It is anticipated that additional scientists and technicians will be hired in 1977. After the initial increase of five persons, program professionals anticipate that the workforce level will stablize and show only a slight increase through 1981. Career potential will exist for those professionals with a four-year degree in one of the natural sciences such as agricultural science or chemistry and for technicians, primarily in the field inspection activities.

IV. POTABLE WATER

The Bureau of Potable Water, which is part of the Division of Water Resources in the Department of Environmental Protection (DEP), has the responsibility for the water supply program in New Jersey.

New Jersey has undertaken to assume all aspects of primary enforcement responsibility in accordance with the federal Safe Drinking Water Act (SDWA) and the federal regulations promulgated thereunder. At this time, New Jersey cannot undertake the necessary supervision required by the SDWA because of the state's critical financial situation.

The current staffing level of the Bureau of Potable Water is 17, seven of whom are engineers. Engineering positions require a degree in the engineering sciences and are normally filled by persons with chemical or sanitary engineering backgrounds. The Bureau also has one sanitarian and five technicians on its staff. DEP contracts with the Department of Health for needed laboratory services for the microbiological and chemical testing of water samples. Half of the employees are professionals, including six chemists and a biologist.

Personnel within the Bureau of Potable Water are projected to increase at a rate of approximately 16 percent per year over the next five years. The Health Department expects to hire five persons, including chemists and lab technicians for water supply support activities by 1981.

V. RADIATION

New Jersey's radiation activities come under the jurisdiction of the Bureau of Radiation Protection located within the Department of Environmental Protection (DEP). New Jersey has ten nuclear power plants in operation, under construction, under review for permit, or announced.

The current staffing level of the Bureau is 41. The program is composed primarily of scientists who are radiation physicists. Others are radiation chemists, research scientists, radiation specialists, and an environmental specialist. All of these people have four-year degrees and most have specialized training in radiation control. The program also has a nuclear engineer, six technicians who are radiation or X-ray technicians, and ten clerks.

Program personnel have indicated that a moderate increase in personnel to 12 is anticipated over the next five years. Most of these will probably be physicists or chemists with training in radiation activities.

The field of environmental radiation can also be expected to grow in the private sector with the addition of several nuclear facilities, two of which are expected to be operating by 1981.

VI. SOLID WASTE

The New Jersey Solid Waste Management Act of 1970 gave authority to the Department of Environmental Protection (DEP) for the registration and evaluation of all solid waste facilities within the state. Those functions are now handled by the Division of Solid Waste Management which has responsibility for the development and formulation of statewide, regional, county, and intercounty plans for solid waste management, including the disposal of chemical and hazardous wastes.

New Jersey's solid waste program has a current staff of 40 people, about half of whom are engineers. Their degrees are in chemical, civil, mechanical, or environmental engineering. There are also ten persons classified as scientists with backgrounds in chemistry, geology, and sanitation.

Officials within the Division anticipate the staffing level to double within the next two years. Most of the additional personnel will be technicians. Personnel are also needed for planning and design for the management of hazardous and chemical wastes.

Careers will tend to move away from conventional landfill and incinerator operators to more highly trained individuals for resource recovery operations. The greatest opportunities will exist for engineers and scientists in the planning, design, and operation of these facilities.

VII. WASTEWATER

In New Jersey, the State Department of Environmental Protection (DEP) has the legal authority and responsibility for the control of water pollution and water quality planning and management. These programs are administered within the Department by the Division of Water Resources.

To carry out its activities, the Division has a staff of 273 at this time. They include engineers, scientists and technicians. The engineers are primarily environmental engineers which requires a minimum of a bachelor's degree in civil, sanitary, mechanical, or environmental engineering. The scientists are environmental scientists, biologists, chemists, or geologists. The technicians are environmental technicians, construction inspectors, and operating personnel. The State Department of Health Division of Laboratories has a staff of ten persons, including chemists and lab technicians who perform water quality work for the Division of Water Resources.

Substantial growth in New Jersey's water quality program is anticipated by program officials. A projected need exists for an estimated 50 percent staffing increase over the next year, followed by increases of five to ten percent per year thereafter. This staffing increase is expected to be for engineers and scientists.

It is estimated that the Health Department may require a doubling in staff from ten to twenty persons for its water quality program.

VIII. ENERGY

New Jersey is currently heavily committed to the construction of nuclear power electrical generating plants. Two plants are now operating; six more are planned or under construction and are anticipated to be completed by the late 1980's. Should all be completed, they will have a total generating capacity of 8,349 megawatts.

The Cabinet Energy Committee, created by executive order to advise the Governor on the development and implementation of energy policy, is made up of the administration of the state energy office, the Attorney General, and various other representatives of state agencies.

The Energy Crisis Study Commission is an investigatory commission composed of private citizens, cabinet officers, and legislators. It was created by the legislature to study energy-related matters. It has a staff of nine who are charged with the tasks of identifying and analyzing energy problems, recommending policy action, promulgating regulations for the sale of motor gasoline, and coordinating energy matters among the various Departments of the State.

STATE OF NEW JERSEY - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	175	183	192	201	211	221	5%
NOISE[2]	5	5	12	16	19	23	43%
PESTICIDES[3]	10	15	16	17	18	19	15%
POTABLE WATER[4]	31	44	46	48	50	53	12%
RADIATION[5]	41	45	52	52	52	53	6%
SOLID WASTE[6]	40	60	70	80	84	88	18%
WASTEWATER[7]	283	422	460	490	512	525	14%
ENERGY[8]							N/A
TOTALS	585	774	848	904	946	982	12%

[1]The above represents only personnel of the Bureau of Air Pollution Control.

[2]The above does not include law enforcement agencies or the private sector for which figures were not available.

[3]The above includes state program personnel, but does not include an estimated 5000 commercial and 15,000 private applicators that will require certification.

[4]The above includes personnel of the Bureau of Potable Water and of the Health Department but does not include water supply and water treatment plant operators for which figures were not available.

[5]The above includes only state agency personnel.

[6]The above does not include private sector personnel for which figures were not available.

[7]The above includes personnel of the Division of Water Resources and of the Health Department but does not include an estimated 1042 certified wastewater treatment plant operators for which projections were not available.

[8]No figures were available at the time of the preparation of this report.

EDUCATION

The colleges and universities of New Jersey have a variety of environmental education programs. Some of the more notable programs include those of Cook College, Rutgers, The State University of New Jersey; Stockto State College; Middlesex County College; Princeton University; and Stevens Institute of Technology.

Cook College offers both undergraduate and graduate programs in environmental science and additionally, conducts environmental training courses for the state's Department of Environmental Protection. Stockton State College has undergraduate programs in environmental studies with options in environmental science and analysis, management and planning, and environmental issues. Middlesex County College offers a technician training program in environmental health sciences leading to a two-year degree. Princeton University offers undergraduate programs in both environmental sciences and environmental studies and operates a Center for Environmental Studies. Stevens Institute of Technology has a minigraduate program in air pollution engineering as well as an undergraduate concentration in sanitary-environmental engineering.

In addition to the above schools, several other colleges and universities have environmental curricula. These include William Patterson College, Bergen Community College, the County College of Morris, Union College, Trenton State College, Burlington County College, and Montclair State College. There are also a number of additional schools offering environmental courses as part of other degree programs.

LEGISLATION

The environmental/energy legislation for New Jersey was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Department of Environmental Protection Act
Environmental Rights Act
Air Pollution Control Act
Noise Control Act of 1971
Pesticide Control Act of 1971
Radiation Protection Act
Solid Waste Management Act
Waste Control Act
Motor Vehicle Junk Act
Coastal Wetlands Protection Act
Clean Ocean Act
Superintendent and Operator Licensing Law
Water Pollution Control Laws
Water Quality Improvement Act of 1971

National Environmental Energy
Workforce Assessment

Phase I

NEW MEXICO

State Summary

I. AIR

Although air pollution problems do exist in New Mexico, the state has large areas in which air is of pristine quality. There are several large industrial facilities which account for some of the air pollution problems.

The larger metropolitan areas of New Mexico have existing air pollution problems. The city of Albuquerque exceeds federal ambient air standards for carbon monoxide, photochemical oxidants, and particulate matter. The problems associated with Albuquerque affect the state's largest concentration of people and are due almost entirely to transportation activities.

The primary responsibilities for air pollution control in the state have been allocated to the Environmental Improvement Agency (E.I.A.) and to the Albuquerque Department of Environmental Health. The Air Quality Division of the E.I.A. administers the state component.

Overall, career opportunities in air pollution control in New Mexico will be limited. From the information presently available, it would appear that the potential careers in this environmental area will be primarily at the degreed level. The most promising opportunities relative to salary and upward mobility most likely will be with private industry in New Mexico.

II. NOISE

Presently there is no state allocated responsibility for the area of noise pollution control and abatement in the State of New Mexico. If responsibility was defined by the state, it would be allocated to the Environmental Improvement Agency (E.I.A.), the Occupational Health and Radiation Division. Noise control is recognized as an environmental problem area. Other than occupationally related noise in the workplace, however, there is no functioning program at present.

The present workforce associated with the area of noise pollution control and abatement is at the local level. There are three cities in the state that have municipal noise ordinances: Gallup, Los Alamos, and Albuquerque.

Noise is recognized as a potential problem in New Mexico. At present, however, the state is sparsely populated and is described as relatively quiet. As industrialization increases and energy resources are developed within New Mexico, the noise levels will increase. Under these conditions it would seem reasonable that the workforce picture, especially at the local level, will experience a slight increase over the next five years.

Career opportunities within the noise field in New Mexico will be rather limited over the next few years. Most of the available occupations will require a degree, and will be highly competitive expecially in the early stages of development.

III. PESTICIDES

In 1973 existing pesticide legislation was repealed with passage of the New Mexico Pesticide Control Act. This Act served to combine pesticide related regulatory functions, which had been administered through the Department of Agriculture and the Health and Social Services Department Environmental Improvement Agency (E.I.A.), and subsequently the Department created the Division of Pesticide Management to administer the law.

The Department maintains cooperative agreements with other federal and state agencies. Examples include: the U.S. Environmental Protection Agency (EPA), the New Mexico State Chemist, New Mexico Environmental Improvement Agency (EIA), and the Albuquerque Department of Health.

Little change in staff is forecast for pesticides personnel across the state. On the federal level no increase or decrease in personnel is anticipated. At the state level a one to two percent per annum growth may occur. At the local level a three percent per annum growth is anticipated. The private applicator numbers will exhibit negligible change to 1982.

Overall, the career potentials in pesticide related occupations will be limited in the state. To date, the farmers have not adopted Integrated Pest Management programs. These programs will be quite limited over the next few years, unless the farmers of the state are convinced of the benefits.

IV. POTABLE WATER

The State of New Mexico, along with several neighboring western states, is described as "water poor". The state, in other words, does not have an abundant supply of water.

Within the state, the primary responsibility for the regulation and environmental management of drinking water has been allocated to the Environmental Improvement Agency (E.I.A.), the Water Supply Program. On the local level, in Albuquerque - Bernadillo County, local food inspectors are responsible for inspecting drinking water supplies. The overall statewide workforce will experience increases over the next three to five years. For the most part, these increases will be at local and private sector levels.

To be in compliance with the Mandatory Utility Operators Certification Act, each water utility serving a population of 2,500 or more must have an operator in "responsible charge". This means the operator must be certified at the level of the utility or better.

Career opportunities will be available on the operator level in all classifications. At the degreed level, engineering will be a field which will illustrate career opportunities. Technician categories will also offer job potential.

New Mexico has indicated to the U.S. EPA its intention to assume primary enforcement authority. Increased activities associated with these new areas of responsibility foretell a challenging future in the area of drinking water for New Mexico.

V. RADIATION

Under the Radiation Protection Act, the Environmental Improvement Agency (E.I.A.) maintains a staff of radiation specialists, as part of the Occupational Health and Radiation Program. A Radiation Technical Advisory Council has been established, and consists of seven members appointed by the governor. The Albuquerque Department of Health maintains a small staff with expertise in the area of radiation. The Albuquerque program problems are mainly associated with medical and dental X-ray.

Within the State of New Mexico the medical, industrial and educational uses of radiation are increasing. Within the last year there has been a 15% increase in X-ray machine registrants and a 10% increase in radioactive materials licenses. New Mexico experts anticipate that the medical licenses will continue to increase, due specifically to the Mason Physics Facility at Los Alamos and to the University Cancer Research Center.

Over the next few years, due to the energy crisis and change to nuclear technology, there should be job opportunities within this field. New jobs will be created as a consequence of advancing nuclear technology and more stringent federal and state legislation. These career opportunities will be available particularly to scientists, engineers, and technicians, specifically those with nuclear and radiation expertise. The future of the radiation field promises to be most challenging.

VI. SOLID WASTE

Solid waste management is a relatively new area of endeavor for the State of New Mexico. The responsibility for the statewide solid waste management program has been allocated to the Environmental Improvement Agency (E.I.A.). The major goal of this program is to ensure proper collection, storage, transportation and disposal of all solid waste materials within the state. There are personnel within the Albuquerque - Bernadillo County Environmental Health Department who contribute to the local workforce in this environmental pollution and control area.

The private sector, ordinarily a substantial component of a solid waste profile, is not a significant factor in New Mexico, and includes approximately five percent of the total workforce. At present, several communities in New Mexico utilize the efforts of private contractors.

The staff of the Solid Waste Management Program is projected to experience little or no increase over the next three years, although the areas of responsibility are enlarging. The recent passage of the Toxic Substances Act and the Resource Conservation Act will exert pressures that may require staff increases for this program. E.I.A. personnel anticipate the possibility of an acceleration of federal construction grants activity. Inspection and evaluation of each proposed sanitary landfill is not only a necessity, but is time consuming and requires trained personnel.

VII. WASTEWATER

The primary responsibility for wastewater pollution control and abatement in the State of New Mexico is with the Environmental Improvement Agency (E.I.A.), Water Pollution Control Program. Diversification of activities within the state's 12,5111 square miles contribute to wastewater related problems unique to a particular area or section of New Mexico. The problems and solutions relative to wastewater and its treatment are compounded by mining and milling activities. To meet these challenges the E.I.A. established the Water Pollution Control Program.

Increases are projected for the statewide workforce to 1982. These increases will be especially manifested at the operator level. Career opportunities in the area of wastewater in the State of New Mexico will be on the degreed level. Areas of study will include: geohydrology, engineering, and environmental technology.

On the operator level, job opportunities will be available in limited numbers. The high turnover rate will encourage opernings as operators leave the field.

New Mexico waters represent nearly pristine quality in the mountains and highly saline conditions in the lower areas. Across the state, however, limited quantities of stream water able to accept wastewater dilution, accentuates the need for treatment.

VIII. ENERGY

New Mexico is considered an energy rich state. The plentiful supply of energy ranks New Mexico as a leading producer of oil, natural gas, uranium and coal. New Mexico ranks first in the nation in uranium production and reserves, is the fourth largest producer of natural gas and ranks fifth in reserves nationally. The San Juan Basin contains the fourth largest natural gas field in the world. Currently, the state exports 90% of it's natural gas and 66% of it's electricity.

The New Mexico Energy Resources Board, formerly known as the Energy Task Force, manages all energy policies for the State of New Mexico. The Board consists of seven members and currently (1976) has a staff of 35. The Environmental Improvement Agency in an effort to address increasing energy related problems, established an Office of Energy Activities.

The state energy plan identifies the following problem areas:

- The rising price of natural gas.
- The burden of rising residential energy costs on low income residents.
- The adequacy of supplies of natural gas for use in state.
- The availability of transportation for the state's natural gas.
- The impact on New Mexico communities of proposed energy projects.

STATE OF NEW MEXICO - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)
(estimated)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	50	51	52	53	54	55	1%
NOISE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PESTICIDES[2]	1,110	1,132	1,155	1,178	1,202	1,226	2%
POTABLE WATER	451	464	478	494	509	524	3%
RADIATION[3]	520	520	521	522	523	523	N/A
SOLID WASTE	681	652	625	599	577	553	- 1%
WASTEWATER	454	466	480	495	509	523	3%
ENERGY[4]	37	38	39	40	41	42	3%
TOTALS	3,303	3,323	3,350	3,381	3,415	3,446	1%

[1]Does not include private sector.

[2]Does not include private applicators.

[3]Does not include projections for private sector.

[4]Does not include private sector projections.

EDUCATION

New Mexico has environmental and energy related post-secondary programs located in several universities and colleges across the state. The youngest state institution of higher learning is the Eastern New Mexico University. An environmental Studies curriculum is available which may lead to a Bachelor of Arts or a Bachelor of Science degree.

The University of New Mexico at Albuquerque offers a Bachelor of Engineering with an energy and power systems option. Associate programs are available in Radiologic Technology and Nuclear Medicine Technology. In cooperation with the Los Alamos Scientific Laboratory the University operates a graduate center for the advanced training of students specializing in chemistry, engineering, mathematics and physics.

The New Mexico State University at Dona Ana offers an Associate of Arts in Water Utility Operation. Also offered through the Division of Continuing Education at Dona Ana is an Associate degree in Radiologic Technology.

There are three institutes conducting environmental/energy research at the main New Mexico State University campus at Las Cruces: the Energy Research and Development Institute, the Environmental Institute and the Water Resources Research Institute.

LEGISLATION

The environmental/energy legislation for New Mexico was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Improvement Act

Air Quality Control Act

Pesticide Control Act

Water Supply Construction Act

Radiation Protection Act

Highway Beautification Act

Refuse Collection and Disposal Law

Sanitary Projects Act

Utility Operators Certification Act

Water Quality Act

National Environmental Energy Workforce Assessment

Phase I

NEW YORK

State Summary

I. AIR

Administration of New York's air program is the responsibility of the Air Resources Division of the Department of Environmental Conservation. The Air Resources Division has a current staffing level of 211 persons. A large portion of these positions are held by engineers who are trained as chemical, mechanical, or sanitary engineers. The 26 persons classified as scientists are required to have a four-year degree in a physical or natural science. Program officials have indicated that persons with specialized training in one area, e.g., biology, are sought for any position which does not require a college degree. These persons are often involved in field inspection and monitoring activities.

Program officials are anticipating a moderate increase in staffing over the next five years, expected to average about six percent per year. This projection reverses past program direction since the Division has suffered a fifteen percent loss in personnel over the past two years.

II. NOISE

The New York Bureau of Noise Control, which is responsible for the state's noise program, is located within the Division of Quality Services of the State Department of Environmental Conservation. The Bureau is responsible for the enforcement of rules to control community noise emanating from industrial and commercial sources. The Department's authority covers all environmental noise problems including industrial noise which extends beyond the boundaries of a particular industrial establishment.

The Bureau is presently staffed with three engineers, a technician, and two other support positions. Only a very slight increase in the workforce level is anticipated for the noise control program over the next five years. Backgrounds in acoustics, engineering, and a scientific area, such as physics, will continue to be desirable for filling the few positions which are expected to open.

New York does not have the necessary financial resources to expand its noise program at either the state or local level without federal assistance. In general, there is expected to be very little career opportunity in this field over the next five years.

III. PESTICIDES

The pesticide control program in New York is under the jurisdiction of the Department of Environmental Conservation (DEC). Within the Department, program activities are carried out by the Bureau of Pesticides of the Division of Quality Services. The Bureau controls the certification of applicators and registration of pesticides and pesticide products.

New York's pesticide program is currently staffed by 19 persons and its 15 scientific personnel are involved in the administration of the program, registration and certification activities. Eleven field inspectors are located in DEC's nine regional offices. In addition to state personnel, there are approximately 10,000 commercial applicators and 25,000 private applicators in New York that will need to be certified under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) as amended.

Professionals working in the Bureau of Pesticides anticipate that staffing in the program will increase from the current 19 programs to a total of 28 by 1981. This represents an increase of nine people, or an average growth of about eight percent per year. It is further anticipated that persons hired in the future will generally be professionals with educational backgrounds in the natural sciences. Some opportunities will also exist for technicians without college degrees, especially in field inspection activities.

IV. POTABLE WATER

The water supply program in the State of New York operates under the jurisdiction of the Bureau of Public Water Supply for the Division of Sanitary Engineering within the State Department of Health. There are currently 94 persons in the water supply program at the state level. Most of the engineers have degrees in sanitary or environmental engineering although the program activities are complemented by sanitarians and technicians.

The workforce in water supply in New York is expected to double over the next five years. Additional engineers, sanitarians, and technicians as well as clerks are expected to be recruited. This increase reflects growing program activity under the proposed assumption of primacy for the federal Safe Drinking Water Act (SDWA). This projected increase in workforce will be made possible largely through federal funding.

New York's decision to assume primacy for SDWA will result in heightened program activities and a need for an increased workforce at all levels. The greatest demand will be for engineers, particularly those with degrees in sanitary engineering, sanitarians and technicians.

V. RADIATION

The Bureau of Radiation, Division of Quality Services, of the State Department of Environmental Conservation shares responsibility for New York's radiation activities with the Bureau of Radiological Health of the State Department of Health. There are currently five nuclear generating plants licensed to operate in New York and at least sixteen more in various stages of planning or construction. New York has obtained agreement state status with the Nuclear Regulatory Commission.

There are approximately 19 people currently employed in radiation control at the state level including the Department of Environmental Conservation and the State Department of Health. Seven are engineers, most with backgrounds in physics or nuclear experience. Other staff serve in various capacities such as radiological health specialists.

Growth in the radiation program in the state will occur principally in three areas: nuclear power, radioactive waste disposal, and control of radiation from naturally-occurring sources. At the state level, workforce levels are expected to remain constant over the next five years.

VI. SOLID WASTE

Solid waste management program responsibilities are located in the Division of Solid Waste Management in the Department of Environmental Conservation (DEC). The state program emphasizes the development of local and regional solid waste management systems.

New York's Solid Waste Management Division has a current staff of 46 people. A majority of these are engineers. Civil, soil, and environmental engineers are sought for landfill operations; chemical, soil, and mechanical engineers for resource recovery. In addition to the engineers, the Division is made up of three scientists who are geologists, three technicians, and twelve administrative or clerical personnel. Statewide, it is estimated that there are more than 3,000 trained, local landfill operators in New York.

Program officials estimate that the Division will double within the next five years. The Division expects to obtain additional personnel as a result of the Resource Conservation and Recovery Act of 1976. A large increase in geologists and engineers is likely. It is anticipated that the number of sanitary landfills in New York will be reduced to about 300 in 1982, thereby reducing the need for operators and other landfill personnel. Moreover, it is expected that resource recovery will replace the need for landfills within the next five years.

VII. WASTEWATER

Responsibility for the wastewater program in New York rests with the Division of Pure Waters of the Department of Environmental Conservation (DEC). EPA has delegated to New York State the responsibility for administering both the municipal construction grants and NPDES permit programs.

The current staffing level for the Division of Pure Waters consists of 414 persons. A majority of those in the Division (227) are engineers. A large number of the engineers have training as sanitary or chemical engineers. The program also includes 67 technicians and 13 chemists. In addition, current estimates indicate that there are 1,107 certified municipal wastewater treatment plant operators in New York and a total of 1,992 persons working in these plants.

Personnel within the Division are projected to increase at a rate of about four percent per year over the next five years. This would increase the level from the current 414 to a total of 505, an increase of 91 persons. Engineers will continue to be the most numerous although the greatest percentage increase is anticipated in the chemist category.

A significant potential for trained treatment plant operators is also anticipated by program officials which are expected to increase by over one third the current number.

VIII. ENERGY

In 1975, the New York State Atomic and Space Development Authority was restructured and renamed the Energy Research and Development Authority. The previous mandate which emphasized nuclear development and space activities was altered to place the primary emphasis on the development of alternative sources of high yield, low cost energy.

The staff of the original authority was 29 in 1975. The 1976-1977 recommended staffing level for the expanded role of the authority was 214.

The New York State Emergency Fuel Office was created by executive order in 1974. The 1976 staffing level was 46. Responsibilities are in conjunction with administration of the mandatory fuel allocation program.

STATE OF NEW YORK - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	211	276	290	305	320	333	10%
NOISE[2]	6	3	7	8	9	9	22%
PESTICIDES[3]	47	47	54	54	54	54	3%
POTABLE WATER[4]	66	66	66	66	66	141	23%
RADIATION[5]	19	19	19	19	19	19	N/A
SOLID WASTE[6]	46	51	51	51	51	51	2%
WASTEWATER[7]	414	429	448	465	485	505	4%
ENERGY[8]	--	--	--	--	--	--	N/A
TOTALS	809	891	935	968	1004	1112	7%

[1]The above represents only personnel of the Air Resources Division.

[2]The above does not include law enforcement agencies or the private sector.

[3]The above includes state program personnel, but does not include an estimated 10,000 commercial and 25,000 private applicators that will require certification.

[4]The above does not include water supply and water treatment plant operators.

[5]The above includes personnel of the Departments of Environmental Conservation and Health.

[6]The above does not include private sector personnel.

[7]The above does not include wastewater treatment plant operators.

[8]No available data on people engaged in specifically pollution control activities.

EDUCATION

New York has a number of colleges and universities which offer programs in environmental science and pollution control technology. While only a small number of schools were contacted, it is evident that many unique educational curricula are available in the state.

Among four-year colleges, the following are examples of environmental offerings: Renssalaer Polytechnic Institute in Environmental Engineering; Manhattan College in Environmental Engineering and Science; Cornell University in Environmental Engineering; and the Cooper Union for the Advancement of Science and Art in Environmental Studies.

At the two-year level programs are more limited but are expanding. Examples of these are Chemical Technology, Environmental Science Option at Erie Community College and Air and Water Pollution Control Technology at Sullivan County Community College.

LEGISLATION

The environmental/energy legislation for New York was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Conservation Law

Environmental Quality Review Law

Air Pollution Control Act

Custom Application of Pesticides Law

Solid Waste Collection, Treatment and Disposal Law

Water Pollution Control Law

Vehicle and Traffic Law

Solid Waste Recovery and Management Law

Tidal Wetlands Act

Freshwater Wetlands Act

Hazardous Substances Act

National Environmental Energy Workforce Assessment

Phase I

NORTH CAROLINA

State Summary

I. AIR

North Carolina's air pollution control program is located in the Board of Natural and Economic Resources and has a staff of 89. Little workforce growth is expected in the program, beyond the possible additions of several engineers, technicians, and a meteorologist. The current staff contains predominately engineers and technicians.

There are four federally-funded local air pollution control programs in the state, and five programs that are totally locally funded. These programs have a total staffing complement of 52 persons, chiefly engineers, scientists, technicians and sanitarians. Sources project that minimal workforce growth will occur in these programs.

State officials estimate that there are at least 500 environmental engineers employed in both the private and public sectors in the state to abate air pollution, who may be employed on either a full- or part-time basis. It is further estimated that there are 250 technicians, and that there may be over 1,000 persons of all backgrounds in the state working in the air pollution field.

It appears that the most likely career potential to develop in the air pollution field will be in the transportation area. Mechanics trained in the inspection and installation of pollution abatement devices in motor vehicles may be needed within five years. Personnel trained in modeling techniques and in the preparation of environmental impact studies will also be in demand, as will environmental economists.

II. NOISE

North Carolina does not currently have a noise pollution and abatement program at the state level. The State Legislature rejected a proposal for a noise program in 1973, which included a plan to provide technical assistance in noise pollution by hiring a person who was technically trained in acoustics. This person would have been available to various municipalities in North Carolina for monitoring and conducting noise surveys to identify problems. Until recently, there was one person in the Office of State Planning that worked half-time in noise, chiefly answering noise complaints. Functions have since been assigned to the Department for Natural Resources and Community Development. No persons have as yet been assigned for a noise control program.

There are few noise ordinances with acoustical criteria adopted by the state's municipalities. A Committee on Boundary Noise in 1973 developed model regulations for steady state noise at municipal boundaries.

With no state noise program in existence or planned, work-force projections are difficult to estimate. However, state officials feel that North Carolina is likely to begin a state noise program within five to ten years. The state's program would probably closely follow EPA guidelines and recommendations.

III. PESTICIDES

The North Carolina Department of Agriculture is the state's principal pesticide regulatory agency. The Department's Pest Control Division carries out the provisions of the North Carolina Pesticide Law of 1971. The Structural Pest Division administers the Structural Pest Control Act. The Food and Drug Protection Division of the Department analyzes residue formulations and other substances for cross-contamination. Within these agencies are 170 persons that work in the field on a full- or part-time basis. In addition, the North Carolina State University Extension Service has 100 extension service training agents who train commercial and private applicators. Staffing levels for state governmental personnel may not increase during the next five years, chiefly due to state budget restrictions. Needs for at least 9 additional positions have been voiced within the Pest Control Division. Most pesticide personnel in the public sector have degrees in agricultural fields.

State sources estimate that 60,000 private applicators will require certification as well as 1,229 commercial ground applicators, 126 commercial aerial applicators, 36 pest control consultants, and 1,641 pesticide dealers. The number of public operators, who apply pesticides for public agencies is estimated at 811. Officials expect a significant growth in the number of certified commercial applicators over the next five years and a growth in the number of public operators. The number of pest control consultants and dealers may remain stable, although the number of dealers may decline.

IV. POTABLE WATER

Water supply responsibilities in North Carolina are entrusted to the Department of Human Resources. The state has applied for assuming primacy of the Federal Safe Drinking Water Act. In order to do so, modification of North Carolina's General Statutes will be required.

Within the Water Supply Branch and the Engineering Planning Branch of the Department, approximately 40 persons service the potable water program, excluding technicians, who are expected to be phased out. This number may increase to 300 positions by 1982 if primacy is achieved. The Department's Environmental Sciences Laboratory has a staff of 19, which spends a portion of its time performing water supply analyses. This number is expected to increase to 44 by 1981.

There are currently 1,734 certified water treatment plant operators. All supplies must have a certified operator in charge by law. The number of operators is expected to substantially increase during the next five years, and these increases are expected for all four operator classifications.

The chief sources of training for plant personnel is the Annual Waterworks Operator School conducted by the North Carolina Waterworks Association. Training is offered for operators of all four classifications.

The Water Supply Branch and the Engineering Branch will hire primarily engineering personnel to carry out the federal Act. Chemists and laboratory technicians will be required in the Environmental Sciences Laboratory.

V. RADIATION

The Division of Facility Services of the North Carolina Department of Human Services is responsible for the state's radiation protection program. The Division's Radiation Protection Branch has four chief programs: X-ray Control, Radioactive Materials Control, Environmental Surveillance and Nuclear Facilities, and Administrative Assistance and Emergency Planning. There are 15 persons in the Branch: 4 health physicists, 2 engineers, 5 X-ray inspectors, 1 planner and 3 secretaries. Personnel of municipal health departments assist in collecting samples. Workforce growth is required, according to administrators, in order to carry out all required duties in the future. Projections include the addition of 13 personnel over the next five years.

State law requires that each user facility in the state have at least one person designated to fulfill radiation control functions, at least part-time. Sources estimate that there are 2,949 such persons in the state. Nuclear facilities in the state have from 35 to 45 radiation safety officers. State officials estimate that the nuclear industry will increase its radiation control staffing level by 10 to 30 over the next five years. No other workforce increases are expected to occur in the private sector.

Health physicists will probably continue to dominate the radiation control field, although increasing numbers of trained technicians may be used by nuclear facilities.

VI. SOLID WASTE

The Department of Human Resources is responsible for implementing North Carolina's solid waste program. This Department, through the Solid Waste and Vector Control Branch, will implement the Federal Resource Conservation and Recovery Act of 1976. The agency will devise plans for the management and disposal of hazardous wastes, and as a result of the new Act, is expected to double or triple its staff of 14 over the next five years. Local county health programs assists the Branch in carrying out a portion of its duties.

There are an estimated 600 landfill operators in the state. Weighmasters, mechanics, foremen, spotters and gatemen are employed only by the larger landfills. For resource recovery operations, the state has directed its efforts at encouraging private industries to invest in resource recovery facilities that could recover both commercial and industrial wastes. Legislation passed in 1976 authorizes the Department to certify facilities that are designed to recover resources.

It appears that career potentials in the solid waste field will dramatically improve as a result of the new federal legislation. The state plans to employ additional chemical engineers, chemists and sanitarians. The exact number of personnel required will be uncertain until a hazardous waste survey is completed and the state decides how deeply it will become involved in promoting resource recovery operations.

VII. WASTEWATER

The Division of Environmental Management of the North Carolina Department of Natural and Economic Resources exercises principal program responsibility for the state's wastewater control programs. The Division's Water Quality Section has a staff of 112 persons: 72 professionals, 24 technicians and 16 supportive personnel. Support for the wastewater program is also derived from the Division of Environmental Management's Enforcement, Laboratory, and Management Sections. The Water Quality Section's staffing level is expected to increase by 30 to 40 positions by 1982. Growth is also expected to occur in the other previously-mentioned sections.

State law requires that each wastewater treatment plant have at least one certified operator in charge. There are currently 1,778 active certificates issued to plant operators. The Division of Environmental Management has estimated that there are currently at least 2,000 operators requiring training and approximately 3,000 additional operators that will require certification and training by 1980.

Sources of training available to operators include Regional Schools, Laboratory Training Schools, Annual Schools, and Advanced Wastewater Treatment Seminars. A survey of wastewater treatment plant operators has revealed that operators feel a number of training needs are not being met. The overall training program will be expanded during Fiscal Years 1977 and 1978.

VIII. ENERGY

The South Carolina Department of Military Affairs housed the Energy Division, the state's energy agency until recently, when it was transferred to the Department of Commerce. The Division was created to carry out operational and planning aspects of energy management and to implement energy policies. The Division is currently concerned with energy allocation, and plans to implement a conservation program under the Federal Energy Policy and Conservation Act. The agency employs 11 people, and moderate workforce growth is expected.

The state's two chief utilities, Duke Power Company and Carolina Power and Light Company employ personnel on staff to abate and control pollution. Data indicates that little environmental staff growth will be required over the next five years. Since most plants planned for construction will be nuclear plants, demands may increase for radiation control personnel.

Energy Division officials expect a great shift towards the usage of coal and solar power sources. Private concerns are becoming involved in commercially constructing solar reflectors, and the Energy Research and Development Administration has chosen a North Carolina site as a possible location for an installation creating energy from wind power. Career opportunities may increase in the field of the development of alternate energy sources.

STATE OF NORTH CAROLINA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR [1]	141	141	142	144	145	146	1%
NOISE [2]	1	0					n/a
PESTICIDES [3]	169	169	178	178	178	178	1%
POTABLE WATER [4]	1,795	2,055	2,243	2,499	2,712	2,926	10%
RADIATION [5]	15	21	21	28	28	28	12%
SOLID WASTE [6]	14	22	30	36	38	41	25%
WASTEWATER [7]	1,890	2,500	3,097	3,867	4,623	5,221	23%
ENERGY [8]	11	19	20	21	22	23	19%
TOTALS	4,036	4,927	5,731	6,773	7,746	8,563	16%

[1] Includes the state and local programs. It is estimated that at least 1,000 people totally work in the field. Figures do not include Research Triangle Park.

[2] Although there currently is no noise program, if noise legislation is passed, the workforce would necessarily increase.

[3] Includes the Department of Agriculture & the Cooperative Extension Service. Not included are approx. 60,000 private applicators, 1,355 commercial applicators, 36 consultants, 641 dealers & 811 public operators. The number of commercial applicators may increase; the other groups may remain stable.

[4] Includes the state agency (1976=59;1981=298) and certified water plant operators.

[5] Includes the state agency but does not include the some 3,600 designated radiation safety officers of the state's radiation using facilities.

[6] Includes the state agency. The number of landfill operators is approximately 600.

[7] Includes the state agency (1976=112;1981=147) and certified wastewater plant operators.

[8] Includes the state lead energy agency.

EDUCATION

There are many educational institutions ranging from university to community college levels in North Carolina that provide environmental curricula. Among the outstanding programs are the Universities of North Carolina at Chapel Hill, Charlotte, and Wilmington. Degrees at the bachelor, master's and doctorate levels in environmental programs at Chapel Hill and bachelor level programs at Charlotte and Wilmington are available. Duke University offers two graduate level programs in Civil Engineering and Environmental Management. North Carolina State University awards graduate degrees in Nuclear Engineering as well as Civil Engineering. East Carolina University offers an Environmental Health curriculum at the undergraduate level. Environmental Studies programs are available at St. Andrews Presbyterian College, Pfeiffer College, and Lenoir-Rhyne College.

Other notable programs include the Air and Water Resource Technology program at Pitt Technical Institute, Environmental Science Technology at Wilkes Community College and Martin Community College, and Environmental Engineering Technology and Water and Wastewater Plant Operators curricula at Fayetteville Technical Institute. Western Piedmont Community College provides a certificate program for Wastewater Treatment Operators. Wilson County Technical Institute offers a Sanitary Landfill Operator-Manager option curriculum. Shaw University offers a curriculum in Environmental Science. Durham College provides a program in Environmental Health Sciences.

LEGISLATION

The environmental/energy legislation for North Carolina was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Policy Act

Water and Air Resources Act

Water and Air Quality Reporting Act

Pesticide Law of 1971

Water and Sewer Sanitation Law

Radiation Protection Act

Solid Waste Disposal Law

Oil Pollution Control Act of 1973

Sanitarians and Water and Waste Water Treatment Facility Operators Law

National Environmental Energy
Workforce Assessment

Phase I

NORTH DAKOTA

State Summary

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I. AIR

The air quality problems in North Dakota are not extensive. The air can be described as relatively clean, although the effects of air pollution have been identified in certain areas of the state.

In compliance with the U.S. Environmental Protection Agency (EPA), two Air Quality Maintenance Areas (AQMA) have been identified: The Cass AQMA, and the McLean-Mercer-Oliver AQMA.

The North Dakota Department of Health, Environmental Control Division, administers the air pollution control and abatement programs across the state through the Air Quality Program. The Air Quality Program consists of two major components: air pollution control and air quality studies.

Although no reliable figures are available at this time, the statewide workforce in air pollution control and abatement is estimated to be exceedingly small, and it is difficult to project workforce requirements for the next three to five years. Staffing increases will occur at the state level. Due to energy development related factors, the private sector should experience growth.

Limited career opportunities, particularly at the degreed level, will be available in North Dakota. Given what might be termed normal operating procedures, however, staff growth will create positions.

II. NOISE

Noise pollution control and abatement is currently being accorded a greater emphasis in North Dakota than in many of the surrounding Rocky Mountain Prairie states. An environmental noise regulation is in the process of being prepared. This would afford the state the necessary authority to administer a state noise law. North Dakota personnel feel the primary need for noise regulated legislation lies in the prevention of potential noise problems. As a consequence, enforcement tools will be available.

Problems associated with energy extraction and conversion as well as other nonagricultural activities describe the near future emphasis for noise pollution control and abatement in North Dakota.

A limited number of personnel are involved in the field of noise pollution control and abatement in North Dakota. The state administers a program through the Department of Health, Environmental Control Section, Division of Environmental Engineering.

There is little evidence that a significant number of career opportunities will develop in North Dakota over the next five years. The current workforce is quite limited and on the local level, only partial effort is allocated to noise control on the part of most personnel.

III. PESTICIDES

North Dakota is predominately an agricultural state. The Department of Agriculture maintains a staff of 26 people. In 1975, the major responsibility for the state Pesticide Act was delegated to the Department. Recently, a pesticide division was added. This division is charged with providing administrative and technical direction to the enforcement of state laws that regulate application of restricted use pesticides as defined by the U.S. Environmental Protection Agency. Pesticides-related problems have neither been extensive nor severe in North Dakota. The establishment of the Pesticide Division, however, was in response to a need to define responsibility for training and applicator certification pursuant to the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

Minimal increases are projected for the state level staff over the next three to five years. Very few changes in the number of applicators (commercial and private) is anticipated to 1982.

Pesticide problems are not extensive in North Dakota. Employment opportunities in both the private and public sector are competitive at present and will continue to be so for several years.

IV. POTABLE WATER

Overall, drinking water quality and quantity in North Dakota has been described as good. Water problems related to consumption are neither as extensive nor as numerous as in many western states. North Dakota lignite and other energy resource development impacts the quantity as well as the quality of the state's waters. Energy development, however, in most cases does not affect the drinking water supply demands to nearly the same degree as waste water treatment.

The North Dakota Department of Health has allocated responsibility for potable water to the Division of Water Supply and Pollution Control. The State of North Dakota has indicated intentions of assuming primary responsibility for the Safe Drinking Water Act. This undoubtedly will affect the workforce profile as increased monitoring, sampling, and reporting will be necessary.

Career opportunities will be available at the degreed and non-degreed levels. The availability of jobs in the drinking water field will be lessened should the state not assume primary enforcement responsibility for the Safe Drinking Water Act.

The greatest area of workforce need is in water treatment and distribution plant operating and supervisory personnel. This is the result of more strict enforcement of existing regulations, new treatment methods, and increased technologies.

V. RADIATION

The major responsibility for radiation control in North Dakota has been allocated to the Department of Health, Environmental Control Section, Division of Environmental Engineering. Public health, safety, and protection of radiation users, at once with the development and utilization of sources of ionizing and non-ionizing radiation, are primary goals of the state program.

The radiation control program in North Dakota encompasses several major areas. Currently, the staff is revising radiological health regulations. X-ray machines in the state are registered, inspected, and re-registered at three year intervals. Over the next three to five years, the workforce necessary for the Department of Health radiation control program will increase.

Career potential within the field of radiological health appear to be good over the next three to five years. The State of North Dakota will increase the workforce allocated to radiation control if uranium development increases. The widest range of career opportunities over the next five years will be on the degreed level. The private sector will require specialized areas of expertise in addition to radiation and nuclear related skills. Environmental Impact Statement expertise will become increasingly marketable in North Dakota as energy resources are developed.

VI. SOLID WASTE

Solid waste management is not a new program in North Dakota. In 1966 the Governor appointed the Department of Health as the lead agency to develop a solid waste management plan for North Dakota. The plan was approved in 1971. In 1975, the Solid Waste Management and Land Protection Act was enacted, and the authority to promulgate rules and regulations was given to the North Dakota Department of Health, Division of Solid Waste Management.

North Dakota has little heavy industry and, therefore, the disposal of hazardous industrial waste products has not been a large problem. North Dakota is an agriculturally based state. As such, pesticides, herbicides, and other compounds utilized in agricultural activities are present in the state and do require a burial or disposal site.

Due to increasing program activities and an enlarged area of responsibility, the Division of Solid Waste Management will experience staff increases over the next few years. Almost no increase is forecast for statewide personnel with the exception of landfill operators.

North Dakota is involved in very little training in the area of solid waste. A need has been established for operator training, especially in the area of hazardous waste disposal. Career opportunities will be available over the next five years, especially in resource recovery and hazardous waste disposal.

VII. WASTEWATER

According to the Office of the Assistant Attorney General of North Dakota, the state has some of the most stringent water pollution laws in the country. Approximately 50 water pollution related cases are processed through that office per year.

Most of the state's serious wastewater problems originate from agricultural and energy related activities. Under the Federal Water Pollution Control Act Amendments of 1972, provisions are made for area wide planning to control water pollution. This is referred to as Section 208 of the Act, and the planning process begins when the Governor designates a statewide or regional area as a 208 planning area. One area, which includes 10 North Dakota counties, has been so designated.

The major responsibility for water pollution control in North Dakota has been allocated to the Department of Health, the Division of Water Supply and Pollution Control which is also responsible for drinking water.

Workforce needs will be in wastewater treatment plant operations and maintenance as well as in administration. This will be a result of strict enforcement, new methods of treatment, changing technology, and plant modification and construction. Increased training and continued construction of municipal treatment facilities as well as extensive 208 planning describe the future North Dakota program.

VIII. ENERGY

The development of natural resources is an area of major concern being confronted by the people of North Dakota. This concern is dramatically displayed by the fact that the state is presently developing the final portions of a State Energy Plan for review by the Legislature. Energy extraction, conversion activities, and conservation plans need to be explored.

North Dakota has large supplies of crude oil and refined petroleum products available. The state's most urgent problems are related to coal development and the utilization of water resources. Energy development is closely aligned with water availability and allocation.

The State of North Dakota lead energy agency has been identified as the Office of Energy Management, Bismarck. The major responsibility of this agency is the administration of the federal allocation program. The staff is small. Recently, the topic of conservation also has been defined as an area of responsibility for the Office of Energy Management.

Career opportunities are expected to develop over the next three to five years for degreed and highly trained engineers, scientists, and research personnel. Few career opportunities are likely to emerge for non-degreed personnel. Increased activities most assuredly will affect the pollution control and abatement workforce of the state.

STATE OF NORTH DAKOTA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)
(estimated)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR [1]	30	30	30	32	33	33	2%
NOISE	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PESTICIDES	12,875	12,766	12,661	12,523	12,389	12,289	- 1%
POTABLE WATER	235	254	271	288	308	329	7%
RADIATION	984	1,004	1,025	1,047	1,069	1,100	2%
SOLID WASTE	92	103	114	127	138	150	10%
WASTEWATER	157	169	180	192	202	211	6%
ENERGY	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTALS	14,373	14,326	14,281	14,209	14,139	14,112	- 1%

[1] Does not include the private sector.

EDUCATION

The higher education institutions of North Dakota offer a very limited number of environmental programs. Several colleges do offer majors in engineering, earth science, biology, agronomy, botany, chemistry, entomology and similar areas which can provide a good background for environmental employment.

At North Dakota State University an Environmental Studies program has been developed although a major is not available in the discipline. Also an environmental concentration is available in the earth science major. The series is designed to assist students in developing the multidisciplinary understanding that is important in finding responsible solutions to environmental problems.

On the two-year level, environmental offerings are also very limited. An Environmental Sciences Technology program at North Dakota State School of Science is apparently the only two-year course available in the state. This program grew out of, and works closely with, the Civil Technology major at the school. In 1976, all of the 10-12 graduates found placement in municipal government or with the state agencies.

LEGISLATION

The environmental/energy legislation for North Dakota was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Pollution Control Act

Noise Control Act

North Dakota Pesticide Act of 1975

Insecticide, Fungicide and Rodenticide Act of 1947

Operator Certification Law

Solid Waste Management and Land Protection Act

Control, Prevention, and Abatement of Pollution of Surface Waters Law

Reclamation of Stripmined Land

National Environmental Energy Workforce Assessment

Phase I

OHIO

State Summary

I. AIR

As a highly industralized state, Ohio has had to face many air pollution problems. The quantity and variety of air pollutants, particularly in the northeastern part of the state, are perhaps greater in Ohio than in any other state.

The Office of Air Pollution Control of the Ohio Environmental Protection Agency (Ohio EPA) is the state lead agency in air pollution matters and for enforcing state air quality standards. The Air Office has personnel in the five Ohio EPA regional offices, and in addition, there are 12 local air pollution control agencies performing services for Ohio EPA.

A staff of 17 persons currently comprises the Office of Air Pollution Control in its three divisions of Program Development and Review, Technical Support operations, and Field Operations. The local air pollution control programs have a combined staff of 278 persons; engineers and environmental scientists, and enforcement personnel.

The Office of Air Pollution Control is currently understaffed and anticipates significant growth to meet legislative requirements. Recent reorganization and attrition problems have caused some difficulty in program functions. Most local air agencies have reached appropriate staffing levels, although the Cleveland office still expects some growth. Engineers are likely to be in demand in most high-level positions and technicians will be required for enforcement and monitoring activity.

II. NOISE

Ohio currently has no statewide noise control and abatement legislation. Limited noise related activities are carried out by the Department of Transportation (DOT) in highway design and by the Department of Public Health (DPH) under the Occupational Safety and Health Act (OSHA).

DOT employs 30 persons who carry out noise review and analysis as it relates to highway construction and design. Twenty of these are engineers and the remaining ten are engineering technicians. DPH has three engineers and two environmental technicians on staff who are engaged in OSHA monitoring and consulting activities. Staff turnover is very low in both programs.

Growth in the Ohio noise workforce is expected to be minimal, although DOT does see some careers for engineering technicians. Budgetary constraints will also limit growth in the noise area as other pollution problems in the state are felt to be more serious. DOT has contracted some noise analysis work in the past and, depending on its hiring authorizations, may do more of this in the future.

III. PESTICIDES

The State of Ohio was one of the first to require the licensing of commercial applicators in 1970. Licensing of applicators and control of pesticides was brought under tighter control following enactment of the Federal Environmental Pesticide Control Act in 1972.

In Ohio, the state lead agency for pesticide matters is the Department of Agriculture. Specifically, the Pesticide Regulation Section with the Division of Plant Industry is responsible for pesticide programs. The Ohio State University Cooperative Extension Service assists in applicator training and Ohio Agricultural Research and Development Center conducts extensive pesticide research and testing.

Four persons staff the Pesticide Regulation Section, including two entomologists and one agronomist. Seventeen professionals are currently active in applicator training although this is not their primary responsibility; common professions include plant pathologists, entomologists and horticulturists. The Research and Development Center has a staff of 879 employees, a significant portion of whom devote some effort to pesticide matters.

The Pesticide Regulation Section predicts that substantial workforce growth will be needed for applicator certification and enforcement activities. Among commercial and private applicators a maximum growth rate of 5% is expected.

IV. POTABLE WATER

Provision of a safe water supply to Ohio's 10.7 million population, along with their numerous business and industries, is a major undertaking. There are over 20,000 public water supplies in the state.

The Office of Public Water Supply within the Ohio Environmental Protection Agency is the state lead agency in potable water matters. The Office is divided into four divisions: Facilities and Operations, Water Quality, Engineering, and Groundwater. A total of 30 persons staff the Office, 13 in Columbus and the remainder in the five state EPA district offices. Twenty of the positions are filled by engineers, usually sanitary or civil; geologists represent the second most common professional category. The Division of Water of the Ohio Department of Natural Resources employs approximately 29 people in water supply matters with geology the most common profession. There are approximately 2,500 water treatment and distribution operator personnel in the state.

Dramatic growth is expected in the potable water field in Ohio, largely as a result of the Safe Drinking Water Act mandates. The Office of Public Water Supply expects to more than triple the number of engineers on staff. Some openings for technicians and a 20% increase in the number of operating personnel are among other projections.

V. RADIATION

Environmentally-related radiation matters in Ohio are the responsibility of the Radiological Health Unit within the State Department of Health. The Unit must enforce radiation standards and control isotopes and radiators when these matters are not handled by the Nuclear Regulatory Commission.

The Radiological Health Unit has a staff of five professionals and one clerical. Four of the professional staff are engineers and the other professional is an engineer. In the private sector there are an estimated 350-400 safety officers involved in some aspect of radiation control.

Workforce for the Unit may be expanded by from two to fifteen positions, depending on the fate of a proposed radiation source licensing law. Most openings are expected to be for radiological health physicists, and the career outlook in this area is considered bright.

The career picture is enhanced by the development of nuclear power facilities in the state. Ohio currently has no nuclear power plants, but three nuclear power complexes with a total of seven units are scheduled to be in operation over the next ten years. The demand for persons with radiological health physics training is treater than the supply; unless more education programs are developed, the situation will probably worsen.

VI. SOLID WASTE

Each year in Ohio more than seven million tons of municipal solid waste are discarded. Surveys indicate that Ohio leads the nation in toxic and hazardous wastes being generated and disposed of without adequate control.

The state lead agency in solid waste and land pollution matters in the Office of Land Pollution Control within the Ohio Environmental Protection Agency. The Office is operated through three Divisions: Solid Waste Management, Hazardous Waste Control, and Program Planning. There is currently a staff of 12 professionals, half of whom are sanitarians and the remainder being engineers and scientists.

The Office of Land Pollution Control is in the midst of major workforce changes. The staffing level has declined from 24 employees with 14 additional authorized positions in May of 1975 to its present level. However, with appropriate funding, the Office anticipates growth to 31 professional and two clerical positions by 1982. Much of the growth is expected as a result of the Resource Conservation and Recovery Act and will be for positions in District Offices.

Greater supervision and specialized treatment of hazardous wastes and nuclear reactor waste will provide many solid waste career opportunities. Additional planning activities will account for part of the growth.

VII. WASTEWATER

Wastewater and water pollution control activities in Ohio have taken on growing importance in recent years in an effort to protect the state's water resources. Ohio's industrial facilities, particularly in the northeastern part of the state, present many unique water pollution problems.

Ohio Environmental Protection Agency's Office of Wastewater Pollution Control has primary responsibility for water pollution matters. The Office has a staff of 124 persons in its six divisions and district offices. Of the 55 people in the Columbus office, engineers, chemists and biologists are the most common occupational category. There are approximately 1,640 certified wastewater operators in the state, and additional local workforce can be found in significant numbers in cities such as Cleveland.

Workforce projections for this office were extremely hard to make because of funding difficulties experienced throughout Ohio EPA. Staff reduction of approximately 25% has occurred in 1975-1976, but significant growth is expected to fulfill legislation. Construction grant activities will require more civil engineers and more technically trained personnel. Persons with wastewater and water pollution experience will be most sought after.

Less growth is expected at the local operator level because Ohio's early activity in this area has filled most needs.

VIII. ENERGY

Energy uses and shortages are taking on increased importance at both the national and state levels. Ohio has a number of energy resources, is a major energy user, and has three state agencies active in the field.

The Ohio Energy and Resource Development Agency (ERDA) coordinates research, allocation and financing programs with a staff of 26 persons. Nearly half of the staff are planners and administrators, a fact which shows the policy-making role of the agency. In the Department of Natural Resources, the Division of Oil and Gas and the Division of Reclamation have a major energy role. The Division of Oil and Gas has a staff of 24 with 15 being field inspectors. Experience in oil or gas production is the main criterion for inspectors. The Division of Reclamation has a staff of 43 which includes 17 inspectors; training in geology, forestry, and agronomy are most common.

Significant growth is expected in the Division of Oil and Gas and the Division of Reclamation as energy production takes on new importance. Use of Ohio coal and more drilling operations will increase the need for inspectors in both of these Divisions. Because of the commercial attractiveness of energy production and research, significant workforce growth in the private sector can also be expected.

STATE OF OHIO - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	71	71	79	82	89	93	6%
NOISE[2]	35	35	38	41	44	47	6%
PESTICIDES[3]	4	8	8	8	11	11	38%
POTABLE WATER[4]	30	50	55	60	76	86	25%
RADIATION[5]	5	5	6	6	7	7	7%
SOLID WASTE[6]	12	15	24	30	31	31	23%
WASTEWATER[7]	55	63	72	82	84	96	15%
ENERGY[8]	93	107	112	114	116	118	5%
TOTALS	305	354	394	423	458	489	10%

1 Does not include 278 positions in local air agencies for which little growth is expected.

2 Includes combined Department of Health and Department of Transportation positions; does not include local enforcement personnel.

3 Includes only Pesticide Regulation Section personnel; does not include approximately 3,000 commercial applicators and 20,000 farmers who may be certified but for which few growth rate figures are available.

4 Does not include 29 ODNR positions or approximately 2,500 operator personnel.

5 Does not include local or private health safety personnel numbering from 350 to 400.

6 Does not include local collection and disposal personnel.

7 Does not include approximately 1,640 wastewater plant operators, 27 ORSANCO positions, and numerous other local personnel.

8 Includes combined totals for Ohio ERDA, and ODNR Division of Oil and Gas and Division of Reclamation.

EDUCATION

A large number of environmentally-related education programs have been developed and are now being offered by Ohio's higher education institutions. Programs are being offered in all areas in all parts of the state and can be partially attributed to the critical environmental pollution problems facing Ohio.

Two-year institutions offering environmental programs include Muskingum Area Technical College, Hocking Technical College, Lorain County Community College, Jefferson County Technical Institute, and many others. Examples of programs are Environmental Health Technology, Environmental Engineering Technology, Natural Resources Conservation Technology, and Petroleum Engineering Technology.

At the four-year level Cleveland State University, Miami University, John Carroll University, Ohio State University, and the University of Cincinnati are some of the colleges with environmental programs. Curricula focus on such areas as environmental sciences, ecology, pesticides, environmental health, environmental engineering, and environmental medicine.

LEGISLATION

The environmental/energy legislation for Ohio was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Protection Agency Act

Air Pollution Control Law

Noise and/or Air Pollution Control Facility Law

Economic Poisons and Devices Law

Pesticide Use and Application Law

Radiation Protection Law

Solid Waste Disposal Law

Water Pollution Control Act

Water Development Authority Act

Watercraft Sewage Disposal and Navigation Law

Power Siting Laws

Strip Mine Law

Energy and Resource Development Agency Law

National Environmental Energy
Workforce Assessment

Phase I

OKLAHOMA

State Summary

I. AIR

Overall, the quality of the air resources in Oklahoma is good. Pollution problems are not severe and the state is developing a stringent program for preventing deterioration of Oklahoma's high air quality. The major sources of air pollution are industry, auto exhaust, open burning and other secondary manifestations of an increasingly affluent society. Oklahoma has been divided into six intrastate and two interstate Air Quality Control Regions (AQCR).

In 1967, the Oklahoma State Department of Health was designated as the official agency to assume administrative responsibility for air pollution control and abatement under the new Oklahoma Clean Air Act.

Under the Oklahoma Clean Air Act, the State Department of Health, Environmental Health Services, Air Quality Service has been designated as the responsible agency to administer the air pollution control and abatement program. Combining personnel, no more than 100 people are occupationally involved in air pollution control and abatement in Oklahoma.

Slight increases in workforce are forecast for Oklahoma to 1982. Across the state, the growth for air pollution control and abatement personnel will be approximately three percent per annum. Career opportunities will be available in air pollution control and abatement to 1985 in Oklahoma.

II. NOISE

At present, there is no state level program in noise pollution control and abatement in Oklahoma. No environmental noise legislation has been enacted. Although there has been no environmental noise legislation adopted by Oklahoma on the state level, local programs are ongoing to a minor degree in two locations. Responsibility for overseeing the noise program will be allocated to the State Department of Health, Environmental Health Services, Occupational and Radiological Health Services. This responsibility has been assigned although there are no personnel at present with full-time noise control activities.

State Department of Health officials have estimated that the workforce allocated to environmental noise control totals 20 across the state. This does not include the numerous secondary personnel, i.e., law enforcement officers who are involved with noise control but on a limited part-time basis.

Increases will occur across the state in industry and on the community level. A five percent per annum growth is anticipated for the community and industry noise control personnel.

Because the workforce in the area of noise pollution control is limited, there is little evidence that a significant number of career opportunities will develop over the next three to five years.

III. PESTICIDES

Pesticides personnel and practices in Oklahoma are becoming more sophisticated as increased research yields better and safer equipment and practices. Increased emphasis is being placed on education of applicators, dealers and manufacturers' agents.

The Oklahoma State Department of Agriculture, Entomology and Plant Industry Division has been allocated responsibility for pesticides usage, storage sales and training and certification of applicators. The protection of the state's people from chemical over-exposure is a major objective of this program. The state level workforce includes 26 personnel while the private category is composed of 2,495 commercial and 20,000 private applicators. Increases will be observed to a limited degree at the state level as well as within the ranks of the commercial applicator category. Private applicators will probably experience no increase in numbers since farming and ranching operations are consolidated due to increased operational costs. If changes occur within the private applicator designation, a slight decrease may be observed.

This field will continue to develop over the next decade as a result of increasing regulations and growing diversity and complexity of the pesticides being used. Consequently, a good deal of upgrading and continuing training for those already in the field will be necessary.

IV. POTABLE WATER

The State of Oklahoma has indicated intentions of assuming primary enforcement responsibilities for the Safe Drinking Water Act, P.L. 92-523. There is every indication that the state not only will assume "primacy" but will be one of the first states in the country to accomplish this.

Overall, the quality of Oklahoma drinking water is considered to be good. An extensive program of monitoring, surveillance, technical assistance and planning is currently ongoing across the state. The major problem related to drinking water is availability of supplies. Oklahoma is a water poor state.

The Oklahoma Department of Health, Environmental Health Services, Water Quality Service has been designated as the agency with primary responsibility for drinking water.

Due to the strong possibility of the state's assuming primary enforcement responsibility under the Safe Drinking Water Act, increases in the staff are anticipated over the next two years. At that time, few staff increases are anticipated for the subsequent two to four years. Growth should occur in operating personnel at approximately three to five percent per annum to 1982. If sound professional core personnel continue to develop, it may be the basis for attractive, though lesser skilled supportive positions. In addition to actual plant operation, research and development activities may well become one of the most promising fields in the future.

V. RADIATION

Radiation control is a definite area of concern expressed by Oklahoma citizens. The use of radiation and radioactive materials is increasing in the state. Oklahoma does not have "agreement" status with the Nuclear Regulatory Commission (NRC). Although the state has not assumed agreement status and does not as yet have a nuclear power plant, other activities involving the use of radiation and radioactive materials are present across the state to varying degrees.

The Oklahoma statutes define the responsibility for the protection of the citizenry and the environment in radiation control. This responsibility has been delegated to the Oklahoma Department of Health, Environmental Health Service, Occupational and Radiological Health Service, Radiation Protection Division. In conjunction with the Division, a radiological health laboratory is responsible for contributing assistance to several national surveillance systems.

The Radiation Protection Division has doubled in staff number over the last two years. There are few changes indicated for this workforce over the next three to five years. Growth will occur in the private sector and at the local level. This anticipated growth is estimated at four to five percent per annum.

Career opportunities should be available in the field of radiation control in Oklahoma over the next three to five years. Highly skilled personnel in the sciences should be in demand.

VI. SOLID WASTE

According to Oklahoma state law, all incorporated cities shall adequately provide for the disposal of solid wastes generated or existing within the incorporated limits. There are presently 641 incorporated communities in Oklahoma. Of the incorporated communities of the state, 51% are presently considered to be in compliance. Unincorporated areas of the state are not addressed by the Oklahoma Solid Waste Management Act.

Legislative authority has designated the Oklahoma Department of Health, Environmental Health Services, Sanitation Service, Solid Waste Management Division as the lead state agency regarding solid waste management. Hazardous wastes also come under the aegis of this Division. The present Division staff includes 12 and the statewide workforce is composed of approximately 1,375.

An increased number of landfill operators, collectors and professional personnel are anticipated for the state level program and across Oklahoma. The state level personnel may double by 1982 to facilitate federal legislation. Private sector and local personnel will experience an approximate 4% per annum growth.

No certification is required for landfill operators in Oklahoma, and training on the local levels is not extensive. Certification of operating personnel would contribute to the safety of these persons. Certification is not thought to be a near future alternative, however.

VII. WASTEWATER

Under the Oklahoma statutes, the Department of Health, Environmental Health Services, Water Quality Service has been designated as the responsible agency with regard to water pollution control and abatement in Oklahoma.

The Water Quality Division is composed of three divisions: the Facilities Construction and Operations; Water Quality Monitoring and Research; and, Water and Wastewater Licensing and Training.

Currently in Oklahoma, there are approximately 500 to 600 wastewater treatment plants. The total number of certified operators has been estimated at1,241, while there are approximately 600 uncertified operators, mostly helpers. There may, in addition, be another 200 persons occupationally associated with the wastewater field in Oklahoma.

The Water Quality Service is anticipated to experience an estimated five percent per annum increase for the next year and subsequently should illustrate an estimated three percent per annum growth to 1982. Approximately a three to five percent per annum growth may be anticipated for the wastewater treatment plant personnel, statewide.

There are a number of skill areas and degreed positions which are presently accessible to those entering the wastewater field. Increased automation will certainly have its effect on employment, but all indications point to an expansion of the wastewater control field.

VIII. ENERGY

Oklahoma ranks third among all U.S. states as an energy producer. But to offset this, the state is a major consumer of those energy products currently in short supply. An increasing concern to the citizens is the relative incompatibility of the production and use of energy on one hand, and the protection of the state's environment on the other.

There are two agencies which have been allocated energy related responsibilities in Oklahoma. These agencies are the Governor's Advisory Council on Energy and the Oklahoma Department of Energy. At present, the number of personnel working statewide in the energy and environmental control area is not known.

The Governor's Advisory Council on Energy as an advisory body may be increased or decreased at any time by the Governor. Staff projections for this committee are unrealistic. The Oklahoma Department of Energy is not able to make firm projections at present. However, staff increases are anticipated over the next three to five years, if only on a three to four percent per annum growth rate.

Options and availabilities of careers will be numerous and representative of a vast range of occupations. Degreed level and higher educational requirements will define the greatest portion. Engineering and scientific personnel with nuclear, coal, geothermal and solar expertise will be specific areas of knowledge that will be in demand.

STATE OF OKLAHOMA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)
(estimated)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR	128	131	135	140	144	147	3%
NOISE[1]	33	35	37	39	41	43	5%
PESTICIDES[2]	2,521	2,597	2,675	2,755	2,838	2,923	3%
POTABLE WATER	2,535	2,625	2,722	2,816	2,912	3,031	4%
RADIATION	1,013	1,056	1,101	1,150	1,199	1,240	4%
SOLID WASTE	1,387	1,436	1,490	1,547	1,581	1,636	3%
WASTEWATER	2,087	2,171	2,260	2,350	2,404	2,527	4%
ENERGY	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTALS	9,704	10,051	10,420	10,797	11,119	11,547	4%

[1] Includes part-time state level personnel.

[2] Does not include private applicators.

EDUCATION

Oklahoma currently has a wide range of environmental/energy related courses and programs which lead to degrees from the Associate to the Doctoral level. For the most part, however, Associate level programs are more prevalent than are Bachelor or post-graduate courses and/or programs.

Oklahoma State University (OSU) has several environmentally related programs and is in the process of expanding the engineering curriculum to include a B.S. degree. A Bioenvironmental Engineering major program is available at the Master's level. Courses are also offered at OSU in Environmental Science which lead to a Master's or Doctor's degree. The Technical Institute at Oklahoma City is a division of the OSU College of Engineering. Two year programs are available leading to an Associate of Science degree in Environmental Health and Environmental Safety.

Environmental Engineering is available through the state system which may lead to an Associate degree at Cameron University, Claremore Junior College, Connors State College, and Eastern Oklahoma State College.

Oscar Rose Junior College at Midwest City (ORJC) offers the Associate in Applied Science (A.A.S.) in two areas of environmental science, which include a general degree in environmental science and a degree in waste-water technology.

LEGISLATION

The environmental/energy legislation for Oklahoma was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Pollution Control Coordinating Act

Oklahoma Clean Air Act

Noise Control Act

Pesticide Applicators Law

Pesticide Law

Ionizing Radiation Protection Law

Solid Waste Management Act

Water and Sewage Works Operators Certification Act

Water Pollution Control Laws

National Environmental Energy Workforce Assessment

Phase I

OREGON

State Summary

I. AIR

Air pollution control programs are administered through the Department of Environmental Quality, Air Quality Control Division. Staffing for the Division includes 36 professionals, 4 clerical positions, 1 student intern, and 1 I.P.A. position. Seven positions will be added to the Division during 1977; however, no further projections were made. The Vehicular Inspection program currently employs 20 inspectors, but this number fluctuates with the schedule of vehicle relicensure.

The nine Regional DEQ Offices provide an additional 18.6 person-years of support to the air program; the Regional Offices have a professional staff of 70 persons. During the next five years, the amount of effort allocated to air programs will most likely be reduced due to program priority reorientation. The projected level of support for 1977 is 17.3 person-years.

There is one regional air pollution control agency in Oregon: Lane Regional Air Pollution Authority. The Authority, which is currently staffed with 15 professional positions, anticipates only limited growth through 1982. Over the next five years, two inspector positions will be added, one in 1978 and the second in 1979. Applicants recruited for the positions will be degreed civil or mechanical engineers.

Research indicates that in excess of 40 professionals are employed in air programs in the private sector; these professionals frequently have degrees in engineering. The private sector workforce appears to have stabilized.

II. NOISE

Noise pollution control and abatement programs are the administrative responsibility of the Oregon Department of Environmental Quality. The Air Quality Control Division, Noise Section has a staff consisting of four professional/technical positions including one engineer, one noise pollution supervisor, and two noise technicians. The Section has requested an additional engineer for 1977 and projects that two to three engineers and one environmental technician will be required before 1982. Expanded program priorities for the Section include emphasizing control of noise at airports, race tracks, and highway construction sites.

The Oregon Department of Transportation administers a traffic noise control program. Three engineers, whose principal activities include noise abatement and control, are currently employed by the Department. Two additional positions, one engineer and one technician, have been requested for 1977. The Department further estimated that two positions would be necessary if program activities in mass transit and airport noise are pursued.

Five municipalities in Oregon had Municipal Noise Ordinances as of 1975; however, Portland offers the most comprehensive program. The Portland Bureau of Neighborhood Environment, the noise control agency, is staffed with three full-time noise specialists. The Bureau does not predict any growth through 1982

Workforce information on the private sector is limited; sources indicated that up to twenty persons are active in technical noise consulting. Projections for the private sector are not available.

III. PESTICIDES

Within the Oregon Department of Agriculture, the Plant Division controls and regulates the use of pesticides and the Laboratory Services Section performs analyses on pesticides, pesticide formulations, pesticide residues, and plant foods. A cumulative staff of 50 persons provide support to the range of pesticide programs administered through the Department. Both the Plant Division and the Laboratory Services Section project an annual growth of 10 percent through 1982.

The Oregon State University Extension Office has one part-time coordinator, one entomologist, one graduate assistant, two secretaries, and six state pesticide specialists who have responsibilities under some aspect of the private and commercial pesticide applicator training programs. The 78 county extension staff members also provide support in the training. The future level of staff support is currently in question; sources indicated that staffing is dependent on continued federal funding.

There are an estimated 250 to 300 commercial pesticide applicator firms that employ an estimated 1,200 to 2,000 applicators. Sources also suggested that there are approximately 3,000 licensed pesticide consultants and 28,000 to 30,000 farmers in the state who apply pesticides. Up to 1,000 persons are also involved in pesticide research and application. No estimates are available on private sector workforce requirements through 1982.

IV. POTABLE WATER

As of July 1, 1977, there will be no state operated potable water program. Early in 1977, the Governor's Office recommended the dissolution of the potable water program, which had previously been administered through the Oregon Department of Human Resources, Office of Sanitation Services. The U.S. Environmental Protection Agency, Region X Office will assume temporary authority for these programs; however, the regional office has noted its intention of negotiating an arrangement with the state to restore the program to the state government.

The Region X Office will be staffing a field office in Portland. Sources indicated that eleven persons will be hired to operate the Oregon program. This will consist of one engineer, one attorney, two secretaries, and seven other professionals. It is anticipated that persons with skills and training in engineering and the physical/biological sciences will be recruited for the professional positions. No growth projections were made for this field staff.

There are 727 community water supplies in the state; however, 55 of the supplies provide service to 47 percent of the state's population. Sources within the state indicated that there are an estimated 299 persons employed in potable water-related jobs. This includes 199 operators, 34 maintenance workers, 18 mechanics, and 56 others. Little change is projected for the private sector workforce during the next five years.

V. RADIATION

The Oregon Department of Human Resources, Radiation Control Service is the primary environmental radiation and radiological health administrative agency. The Service has a total of 20 authorized positions. A proportion of the professional staff have experience and training as radiation health physicists, radiation chemists, and radiation specialists. The Service projects minimal growth during the next five years, with a cumulative increase of only one position.

Information on private sector workforce occupations for the State of Oregon is limited. It has been projected that as many as 1,000 persons may be employed in "radiation control" programs, with a majority of the persons having backgrounds in engineering.

In a 1975 study entitled An Analysis of Nuclear Related Technician Manpower in Western States, the Energy Research and Development Administration stated that there would be an estimated 913 persons active in the Nuclear Related Technician Workforce in the State of Oregon in 1976. The study reported that by 1977 a total of 983 persons would be required in the nuclear related technician workforce. The annual increase for personnel in this field has been estimated at 8 percent. If this trend continues, by 1981 there will be approximately 1338 employees in the nuclear related technician workforce in Oregon.

Sources noted an emerging interest in non-ionizing radiation research; this may generate a long-term impact upon the private and public sectors.

VI. SOLID WASTE

Administrative authority for solid waste management programs is under the Oregon Department of Environmental Quality, Solid Waste Division. Thirteen professionals are currently employed in the Division. No growth is planned during the next five years. Nevertheless, if any new federally funded programs were implemented, e.g., resource conservation and recovery, additional staff will be required.

The Regional Offices currently provide 5.3 person-years of support to the Divisions; this level is projected to grow to 11.7 person years during the next two years. The Laboratories and Research Division provide an estimated 1 person-year of analysis, and no growth is projected in the level of support.

The Oregon Liquor Control Commission operates the Oregon Beverage Containers Certification Program. The commission indicated that the program is self-contained and that less than one person-year of effort is required to administer the program.

Private sector projections are limited. No data is available on the landfill workforce. The one operable hazardous waste site is staffed with three operators and one secretary. Three engineers provide auxiliary technical support to the program. There are no resource recovery processing facilities in Oregon. Information on collection systems is not available. Growth in the landfill, hazardous waste, and collection system workforces will be limited through 1982. Substantial growth is expected in the resource recovery field, as the four planned facilities become operational and employ 40 persons.

VII. WASTEWATER

The Department of Environmental Quality, Water Quality Division has primary responsibility for wastewater control and abatement programs for the State of Oregon. The division has 35 authorized positions which include 27 professionals, 1 technician, and 7 secretaries. No staffing increase is projected through 1982. The DEQ regional offices provide an estimated 30.7 person-years of support to the Water Pollution Control Program and 19.6 person-years of effort to the Subsurface Sewage Program. DEQ predicts a decrease in the percent of staff effort allocated to these two programs. During the next fiscal biennium, only 48.4 person-years of effort will be devoted to these programs.

Four Councils of Governments are recipients of 208 Planning grants. An estimated 16 professionals are employed in 208 activities. An additional 41 persons are involved in local 208 programs. The future staffing of these programs are dependent on the level of local funding.

Field research indicates that between 650 and 700 persons are employed in wastewater-related occupations in municipal treatment facilities. No estimate is available on the number of employees in the industrial and agriculturally related wastewater treatment facilities. No major growth is expected in the private sector during the next five years. The state is attempting to limit rising costs through consolidation of smaller facilities.

VIII. ENERGY

The Oregon Department of Energy, which was created in 1975, coordinates a broad spectrum of energy related programs. At present, the Department has a full staff of 30 members: 25 professionals, 4 secretaries, and 1 temporary student worker. During the next fiscal biennium, the Department expects to expand its staff to 43 positions. The greatest growth will occur in the administrative and engineering categories. The Department was hesitant to make staffing projections through 1982 due to the recency of the program's organization.

The Energy Policy Review Committee provides policy and advisory support to the Department. The Committee consists of nine members: three Governor appointees, three House appointees, and three Senate appointees.

Comprehensive information of the private sector energy related workforce is currently unavailable. Most utility companies have environmental components which have responsibilities related to planning, air pollution control, environmental noise control, and wastewater pollution control. One example of such a component is the Portland General Electric Company, Department of Environmental Services. The twelve member staff have professional experience in several disciplines including biology, meteorology, physics, geography, radiation technology, and engineering. In addition to the Department of Environmental Services, it is projected that 20 to 25 persons in other departments provide support to the program.

STATE OF OREGON - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	90	95	96	97	97	97	2%
NOISE[2]	20	20	20	20	20	25	5%
PESTICIDES[3]	71	74	75	81	85	90	5%
POTABLE WATER[4]	299	310	310	310	310	310	1%
RADIATION	934	1,004	1,083	1,169	1,261	1,360	8%
SOLID WASTE[5]	18	25	25	25	25	25	8%
WASTEWATER[6]	78	76	76	76	76	76	-1%
ENERGY[7]	30	43	43	43	43	43	9%
TOTALS	1,540	1,647	1,728	1,821	1,917	2,026	6%

[1]No estimates were available on the private sector workforce for air programs.

[2]These figures include estimates for the state program and limited information on the private sector.

[3]The above does not include the estimated 28,000 to 30,000 farmers, 3,000 pesticide consultants, 1,200 to 2,000 applicators, and 1,000 private researchers.

[4]These estimates include only workforce information on the U.S. EPA, Region X field office staff and the private sector.

[5]These estimates do not include the private sector.

[6]These estimates do not include private sector projections.

[7]The above does not include private sector workforce information.

EDUCATION

The State of Oregon offers a variety of environmentally-related programs throughout its educational system. There are programs on the graduate, four-year, two-year, and one-year level available to persons interested in obtaining degrees, certificates, or diplomas.

Linnfield College and Oregon State University are two of the four-year institutions which offer degrees in the environmental field. Two-year institutions which offer either degrees, certificates, or diplomas or simply environmental courses include Clackamas Community College, Umpqua Community College, Linn-Benton Community College, Treasure Valley Community College, Southwestern Oregon Community College, and the Oregon Institute of Technology. Programs include environmental health, environmental health technology, wastewater technology, water treatment/wastewater technology, water/wastewater plant operations, environmental sciences, and environmental studies.

In the State Report a more detailed outline of programs at Linn-Benton Community College and Oregon State University are presented.

LEGISLATION

The environmental/energy legislation for Oregon was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Quality Commission Law
Air and Motor Vehicle Pollution Control Law
Noise Control Law
State Pesticide Control Act
Beverage Container Law
Hazardous Wastes Law
Solid Waste Management Law
Sewage Treatment and Disposal Systems Law
Water Pollution Control Law
Law Relating to Detergents
Comprehensive Land Use Planning Law
Energy Conservation Law

National Environmental Energy
Workforce Assessment

Phase I

PENNSYLVANIA

State Summary

I. AIR

There are six Air Quality Control Regions (AQCR) in Pennsylvania as provided for in the State Implementation Plan (SIP). The AQCRs include: Metropolitan Philadelphia Interstate, Northeast Pennsylvania - Upper Delaware Valley Interstate, Northwest Pennsylvania - Youngstown Interstate, Central Pennsylvania, South Central Pennsylvania, and Southwest Pennsylvania.

Air pollution control and abatement activities in Pennsylvania are the responsibility of the Bureau of Air Quality and Noise Control, located within the Department of Environmental Resources (DER). Pennsylvania's efforts in air pollution control originated in 1960 with the passage of the Air Pollution Control Act.

The Bureau of Air Quality and Noise Control has a staffing level of 224 persons. Estimations of statewide staffing levels were inconclusive at this writing.

DER officials have indicated that the program staffing levels can be expected to increase to 325 persons, or a gain of 101 by 1982. This represents a seven percent per annum increase. It has been estimated that a workforce of 405 persons would be required for implementation of the program. Turnover has been very low, about two percent, and is expected to remain at that level. Increases are expected to occur in all categories, but opportunities will still be greatest for engineers.

II. NOISE

The noise program in the Commonwealth of Pennsylvania is the responsibility of the Bureau of Air Quality and Noise Control, located in the Department of Natural Resources. The bureau is responsible for the enforcement of rules to control community noise emanating from industrial and commercial sources. The Department's authority includes all environmental noise problems.

At present, there is only one person, a scientist, involved in the noise program in the Bureau of Air Quality and Noise Control. The noise program does not formally exist in the state budget. Although there are currently no funds allocated for noise control in the state, professionals estimate that the state budget could allow for 12 to 15 people in noise control over the next five years.

No firm figures are available for the private sector. Ordinarily, these personnel would be involved in other activities such as law enforcement.

Career potential in the noise program is dependent in large part upon the availability of funds to expand the program over the next few years. If professional workforce projections hold true, there would be limited career opportunities for engineers and scientists. Generally, a four year degree will be required with some specialized training in noise abatement and control or advanced training in acoustics. Several technical positions may be created if the resources become available to implement new programs.

III. PESTICIDES

The Pennsylvania Department of Agriculture, Bureau of Plant Industries, has responsibility for implementation of the state's pesticide control program. The legal authority for pesticide regulation is the Pennsylvania Pesticide Control Act of 1973. The law provides for the certification of pesticide applicators and the registration of pesticides and pesticide products.

In addition to 13 state program personnel, professionals estimate that there are 50,520 private applicators and 5,750 commercial applicators in the state that must be certified under the law. Thousands of others, primarily farmers, are also pesticide applicators but do not require certification.

The Bureau of Plant Industries has indicated that substantial growth in the pesticides program could occur over the next five years. The projections would increase the program to between 17 and 30 people by 1982. The primary need is for field inspection personnel. Projections for the applicator categories were unavailable at this writing.

There appears to be a limited amount of career potential in pesticide control at the state level. Program officials suggested a wide range in the staffing projections for the next five years. If optimum projections are correct, there will be a demand for technically trained persons as field inspectors and laboratory technicians.

IV. POTABLE WATER

The Pennsylvania Department of Environmental Resources conducts the water supply program through the Bureau of Water Quality Management, Division of Water Supply and Sewerage. The program mission is to ensure that public water supplies provide safe and sanitary drinking water.

There are currently 126 persons in water supply at the state level, primarily engineers with degrees in sanitary engineering, sanitarians, and clerical support personnel. In addition, there are 67 persons who provide support services to both the water supply and wastewater programs in the Department.

Workforce projections for water supply in Pennsylvania are unapproachable at this time. Financial constraints will undoubtedly inhibit growth at the state level, also making it unlikely that Pennsylvania will assume primacy for the Safe Drinking Water Act. However, the state must still comply with SDWA regulations, and it is possible that this will require an increased workforce.

The potential for careers in water supply in the Commonwealth of Pennsylvania is dependent, in large part, upon the state's ability to finance new training programs and support new positions, as well as the federal government's commitment to provide funding to the state for expansion of its water supply program. However, Pennyslvania's decision not to assume primacy for SDWA will be an inhibiting factor with regard to job availability.

V. RADIATION

Primary responsibility for radiation protection has been allocated to the Bureau of Radiological Health, the Department of Environmental Resources (DER). Under the Pennsylvania Atomic Energy Development and Radiation Control Act, the State Department of Commerce is responsible for the promotion and development of atomic energy resources and the coordination of atomic energy activities of various agencies and units of government. There are 11 nuclear power facilities located or planned for future location in Pennsylvania.

The present workforce includes 24 persons at the state level. The private sector staffing levels were unavailable at this writing. At the state level, growth should occur at an average rate of 11% per annum.

Program officials anticipate that requirements for future careers in radiation protection will not change significantly from current requirements. Within the state program, the majority of available positions will continue to require radiation health physicists. Career potential will be very limited for non-professionals.

In the private sector, career potential will exist at nuclear power plants. It is estimated that five additional nuclear facilities will be in operation by 1981. Although it is difficult to precisely forecast occupational availability, an increased number of jobs will be available through these additional facilities.

VI. SOLID WASTE

The solid waste management program originated in Pennsylvania in 1966, with a federal program grant which financed a statewide inventory of collection, processing and disposal practices. The findings of the 1966 survey resulted in the enactment of the Pennsylvania Solid Waste Management Act in 1968, the first comprehensive statewide solid waste legislation in the nation. In 1972, the Department of Environmental Resources (DER) was created and solid waste management became a function of this agency. The program is now administered through the Division of Solid Waste Management of the Bureau of Land Protection within DER.

County-wide solid waste management plans have been developed in 66 of the 67 counties and regional plans have been adopted in 3 multi-county regions. Implementation of the plans has proceeded slowly due to limited funding by local governments. There are nearly 500 disposal facilities within the state, of which 123 are permitted sanitary landfills. The 375 other sites operate without permits and the DER is unable to close them down since viable disposal alternatives do not exist in those areas.

The state level workforce includes 72 persons. Additional workforce in solid waste management exists at the community level in landfill operations and waste collection and in the private sector in landfill operations, collection, and resource recovery. State level personnel should experience a 9% per annum increase. Statewide staffing projections were unavailable at this writing.

VII. WASTEWATER

Pennsylvania's wastewater program is the responsibility of the Bureau of Water Quality Management within the Department of Environmental Resources. The Bureau of Water Quality Management has performed numerous activities in carrying out the mandates of the Federal Water Pollution Control Act Amendments (FWPCA) of 1972.

Both the Delaware Valley Regional Planning Commission and the Southwestern Pennsylvania Regional Planning Commission were designated as areawide and basin water quality management planning agencies under Section 208 of FWPCA. The Comprehensive Water Quality Management Planning program has been continued in other portions of the state to serve as the base for "208" planning.

The current staffing level of Pennsylvania's wastewater program consists of 175 people located in the Bureau of Water Quality Management. The number of persons working in wastewater control across the state was unavailable at this writing.

Career potential in the wastewater program is impossible to predict accurately since projections of workforce demand are not available. Because of the budgetary problems within the state little, if any, opportunity exists at the present time in this program. It can be assumed, however, that the demand for trained operations personnel in sewage treatment plants will continue to exist at the local level.

VIII. ENERGY

Energy Office functions in Pennsylvania are the responsibility of the Governor's Energy Council, which was established by Executive Order of the Governor on Febraury 11, 1974. The Council is basically a coordinating agency which draws much of its technical expertise from other state agencies. Under the Executive Order, the Council has the authority to mandate a technical workforce from other state departments. The Council is composed of members of many state agencies so there is a very good relationship with other department organizations within Pennsylvania. The Council has developed expertise in developing a Coal Revitalization Policy, an Energy Parks Policy, a Conservation program, an Allocation program and a Winterization program.

The Energy Council has a total present staff of about 27 to 28 persons and most of its personnel have a public relations orientation. The Council's coordinators provide liaison with other officials in the Pennsylvania government for supportive services. The Council's officials anticipate hiring an additional 22-23 people to bring its total staffing level to about 50 by 1978. The Council is currently recruiting personnel to fulfill state emergency and conservation planning mandated under the Federal Energy Policy and Conservation Act. The Council intends to recruit a couple of engineers for its buildings insulations program, three to four public relations personnel, an economist, a computer specialist and clerical support personnel. Additional student interns may also be recruited from the University of Pennsylvania and Penn State to provide technical expertise.

COMMONWEALTH OF PENNSYLVANIA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	224	232	259	276	306	325	7%
NOISE[2]	1	1	6	9	12	12	117%
PESTICIDES[3]	13	13	27	27	30	30	23%
POTABLE WATER[4]	126	--	--	--	--	--	N/A
RADIATION[5]	24	24	30	30	36	39	11%
SOLID WASTE[6]	72	81	90	99	106	110	9%
WASTEWATER[7]	175	--	--	--	--	--	N/A
ENERGY[8]	27	38	50	50	50	50	14%
TOTALS[9]	362	389	462	491	540	566	9%

[1]The above represents only state agency personnel.

[2]The above does not include law enforcement agencies or the private sector.

[3]The above represents optimum growth projections for state agency personnel, but does not include 5,750 commercial and 50,520 private applicators to be certified.

[4]The above includes only state agency personnel.

[5]The above includes only state agency personnel.

[6]The above does not include private sector personnel for which no data were available.

[7]The above includes only state agency personnel.

[8]The above totals include only state energy agency personnel.

[9]Insufficient data to make realistic projections (re: water programs).

EDUCATION

Several colleges and universities in the Commonwealth of Pennsylvania offer environmental career options. Bachelor degrees are available from both Temple University in Philadelphia and Pennsylvania State University in University Park. Pennsylvania State offers an undergraduate program in Environmental Engineering, as well as an associate degree in Air Pollution Control Engineering Technology. The Environmental Engineering program provides the students with a choice of electives in water, wastewater, solid waste, radiation, and noise. The associate degree program concentrates upon technical skills in sciences, electronics, and air pollution control.

Temple University, likewise, awards an associate degree in Environmental Technology, in addition to the bachelor's degree in Environmental Engineering Technology. Supplementing the engineering fundamentals courses, the bachelor's program offers the students a choice of electives in industrial hygiene, wastewater, potable water, and solid waste. Students enrolled in the associate degree program are eligible to take many of the same electives offered in the bachelor's program.

Drexel University, located in Philadelphia, has both a Master's and Doctoral program in Environmental Engineering and Science. Program options are available in water, wastewater, industrial hygiene, air pollution control, solid waste, radiation and oder.

The Community College of Allegheny County, Boyce Campus has an Environmental Technology Program that culminates in an A.S. degree.

LEGISLATION

The environmental/energy legislation for Pennsylvania was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Resources Law

Air Pollution Control Act

Pesticide Control Act of 1973

Atomic Energy Development and Radiation Control Act

Environmental Radiation Protection Act

Solid Waste Management Act

Sewage Facilities Act

Clean Streams Law

National Environmental Energy
Workforce Assessment

Phase I

RHODE ISLAND

State Summary

I. AIR

The Division of Air Pollution Control of the Rhode Island Department of Health is responsible for achieving the national ambient air quality standards outlined in the Rhode Island State Implementation Plan. The division is principally staffed with sanitary engineers and sanitarians, who serve as field inspectors.

It is projected by department administrators that the division may increase in staff by twenty-five percent by 1982. Two sanitarians and a sanitary engineer may be recruited in the next couple of years. Currently, laboratory analytical personnel assigned to work on air pollution are under the authority of the department's Laboratory Division. The department may reorganize laboratory personnel under the direct control of the Division of Air Pollution Control in a new Technical Services Section. The division personnel may then be organized into a Compliance Section and a Technical Services Section.

The Division of Air Pollution Control may obtain responsibility for initiating a program to inspect and maintain motor vehicle emission control systems. The department may undergo a reorganization and additional personnel may be acquired. At the present time, it is considered unlikely that the Rhode Island General Assembly would support significant air pollution control staffing increases due to budget constraints.

II. NOISE

The Division of Occupational Health of the Rhode Island Department of Health has responsibility for the state's noise control activities. Rhode Island has not yet enacted statewide noise control legislation, although such proposals have been presented to the Legislature in the past. Legislation providing the State Department of Transportation with authority to regulate motor vehicle noise pollution was enacted in 1976. The Division of Occupational Health is primarily concerned with OSHA aspects of noise pollution control relating to worker safety, although the staff assist Rhode Island communities in developing municipal noise ordinances whenever requests for assistance are received.

The division has one occupational health specialist specifically designated to work with occupational health programs regarding noise pollution. This person receives technical assistance from a laborer-technician who performs monitoring/sampling duties for both noise and radiation levels.

Minimal growth in the field of noise pollution control and abatement is expected over the next five years. If additional responsibilities are acquired by 1982, the division may recruit more occupational health specialists to perform audiometric testing. Careers may be created in the public sector for industrial audiometric testing and community noise enforcement, and for regulation of highway noise levels.

III. PESTICIDES

The Rhode Island Department of Natural Resources has been designated by the U.S. Environmental Protection Agency (EPA) as the lead agency for the certification of pesticide applicators and also has responsibilities to enforce pesticide control legislation. Specific program functions are carried out by the Division of Agriculture. The Rhode Island General Assembly passed legislation during 1976 entitled the "Rhode Island Pesticide Control Act" which enables the state to comply with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) as amended. The Cooperative Extension Service of the University of Rhode Island is actively involved in the training of applicators.

The Division of Agriculture has designated a plant pathologist, an entomologist, and a secretary to conduct the pesticide program. It is anticipated that the Division will hire a field inspector and an enforcement officer to spend at least fifty percent of their time on this effort to initiate an inspection and field surveillance program.

Because private applicators will be required to participate in a continued training program, there is likely to be a decrease in the number of private applicators. This will result in a corresponding increase in the number of commercial applicators providing services in the next five years. All applicators are required to participate in a retraining program within five years from the time they were first certified.

IV. POTABLE WATER

Responsibility for the state's potable water program belongs to the Division of Water Supply of the Rhode Island Department of Health. Rhode Island is currently preparing to assume primacy for the federal Safe Drinking Water Act (SDWA), but the state program lacks both an adequate staff and a certification program for water treatment plant operators. If the Division of Water Supply assumes primary enforcement responsibilities for SDWA, the Rhode Island drinking water program could double in size.

The Division of Water Supply monitors all public water supplies, approves plan specifications for water supply systems, and assures the safety of Rhode Island's drinking water. It is currently staffed with eight persons, and the water pollution control and water supply program personnel interchange functions as needs develop. The division employs mainly sanitary engineers, sanitarians, and clerks. The Health Department's Laboratory Division assists the Division of Water Supply in performing analytical services. It is staffed with chemists, microbiologists, laboratory technicians, and sanitary aides.

It is projected that one sanitary engineer and three to four sanitarians will be hired by the Division of Water Supply to perform preparatory tasks required to assume primacy for SDWA. Once the state initiates a certification program for water plant operators, demand for skilled operators is expected to increase.

V. RADIATION

Radiation control program responsibilities are carried out by the Division of Occupational Health of the Rhode Island Department of Health. Most of the division's radiation control activities concern registering and monitoring radiological health equipment such as medical and dental X-ray machines. The Rhode Island legislature in May, 1976, passed legislation authorizing emergency response planning and creating an environmental radiation surveillance network.

The division is currently staffed with radiological health specialists, occupational health specialists, chemists, and technicians. In the next five years, the division may recruit a radiological health specialist and two occupational health specialists to complement its present staff.

In the private sector, the New England Electric Company is planning the construction of two Charlestown nuclear power plant units to be completed by 1984 or 1985. The potential demand for health physicists in Rhode Island is expected to remain rather limited until these units are completed.

VI. SOLID WASTE

The Division of Solid Waste Management of the Rhode Island Department of Health has principal solid waste management responsibilities. Incinerators and sanitary landfills are the primary means by which the state's solid waste is disposed. The division is encouraging regionalization of landfills by offering state grants to communities willing to participate in the program.

A Rhode Island Solid Waste Management Corporation was created in 1974 to carry out activities required by Rhode Island's Solid Waste Management Plan. The ultimate objective of the Corporation is to maximize resource recovery, recycling, and reuse throughout Rhode Island.

The division currently is composed of five persons who include three engineers, a sanitarian, and a secretary. It is estimated that each of the state's thirty-three sanitary landfills have at least three operators employed. The Division of Solid Waste Management may recruit two chemical engineers, a sanitarian, and a secretary after 1978 to fulfill the requirements of the Federal Resource Conservation and Recovery Act. It is not anticipated that these personnel will be recruited prior to 1978 because the state has not yet enacted comprehensive legislation authorizing the State Health Department to develop a hazardous wastes management plan.

VII. WASTEWATER

Responsibility for wastewater pollution control in Rhode Island belong to the Division of Water Pollution of the State Department of Health. Rhode Island has not yet been delegated responsibility by EPA to conduct either the allocation of construction grants or the National Pollutant Discharge Elimination System (NPDES). The state advocates community regionalization in their use of common wastewater treatment plant facilities.

The division is mostly professionally staffed with sanitary engineers, a biologist, and sanitarians. Laboratory support is provided by chemists, microbiologists, laboratory technicians, and sanitary aides. By 1982, the division is projected to recruit sanitary engineers, and an aquatic biologist.

Additional wastewater treatment plant personnel will continue to be needed by Rhode Island communities to supervise, operate, and maintain treatment facilities. It has been estimated by the division that the state will need approximately 100 new wastewater treatment plant personnel in addition to those who are expected to replace existing staff through either relocation or retirement. Program officials anticipate that twenty-five operators annually enter the field and at least five operators need upgrade training each year.

VIII. ENERGY

Rhode Island's State Energy Office was created by an Executive Order of the Governor in 1975. The office is to manage the state set-aside program of petroleum supplies and to initiate programs related to energy conservation and resource development.

The Rhode Island Energy Office is currently planning a reorganization of its functions into other state agencies. It is not clear at this time just what effect a reorganization will have on the office but it is primarily involved with energy allocations.

The office has one administrator who is responsible for energy conservation and another who is attached to the Governor's Office who is involved with research and development programs. This person is attached to the Governor-appointed Energy Advisory Council.

The State Energy Office currently has a total staff of six persons, but due to reorganization and shifting of functions, it is not possible to project what the office's staffing level may be by 1982.

The New England Electric Company is planning to construct two nuclear power sites at Charlestown, Rhode Island, each of 1,200 capacity, to be completed in 1983 and 1984. United Nuclear Corporation also operates a nuclear scavenging facility whose purpose is to recover scrap from the ore used in the manufacture of fuel rods from nuclear reactors.

STATE OF RHODE ISLAND - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	15	22	24	27	29	30	16%
NOISE[2]	2	--	--	--	--	--	N/A
PESTICIDES[3]	1,112	--	--	--	--	--	N/A
POTABLE WATER[4]	19	20	23	25	27	28	8%
RADIATION[5]	10	10	11	11	12	13	5%
SOLID WASTE[6]	5	6	8	9	9	9	13%
WASTEWATER[7]	34	34	36	37	39	39	3%
ENERGY[8]	6	--	--	--	--	--	N/A
TOTALS	2,103	--	--	--	--	--	N/A

[1]The above includes only state regulatory and laboratory personnel.

[2]The above includes only state agency personnel. No other data are available.

[3]The above includes all state agency and extension service personnel as well as 400 commercial and 200 private applicators.

[4]The above includes 10 regulatory and 9 laboratory state agency personnel.

[5]The above includes 8 state agency personnel and 2 private sector individuals.

[6]The above includes only state agency personnel.

[7]The above includes only state agency personnel.

[8]The above includes only state energy agency personnel.

EDUCATION

The Rhode Island post-secondary educational institutions offer few environmental education programs. Nearly all colleges and universities within the state offer selected environmental courses in basic ecology, population, and environmental engineering techniques; however, few comprehensive environmental degree programs are available.

Two institutions in the state offer degrees with environmental career options: Roger Williams College and Woonsocket Area Vocational Technical Facility. A Bachelor of Science degree in Urban and Environmental Planning and an Associate of Science degree in Power Engineering Technology are awarded through Roger Williams College. The Associate program prepares the student for operation and maintenance of heating, ventilation, humidity control, air conditioning, and power generation equipment. While the students may also serve in such positions as engineering technician, estimator, designer, planner, inspector, and tester of engineering equipment, it is recognized that they should perform these functions with the proper engineering supervision. Students enrolled in the Urban and Environmental Planning Program receive instruction in creative planning and design, including details in equipment installation, operation, production, and maintenance.

A certificate program in Environmental Control is available through the Woonsocket Area Vocational Technical Facility. The program offers students a basic orientation to general environmental information and technical management skills. Specific training is available in Greenhouse and Nursery Management, Environmental Monitoring, and Land Use Planning.

LEGISLATION

The environmental/energy legislation for Rhode Island was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Pollution Episode Control Act

Clean Air Act

Pesticide Control Law

Radiation Control Act

Solid Waste Law

Water Pollution Control Law

Coastal Resources Management Council Law

National Environmental Energy
Workforce Assessment

Phase I

SOUTH CAROLINA

State Summary

I. AIR

The South Carolina Department of Health and Environmental Control (DHEC) is responsible for implementing the state's air pollution control program, which is authorized by the Pollution Control Act of 1970. DHEC employs 65 persons for air pollution control, both in its central office in Columbia and in the agency's twelve district offices. These include 13 engineers, 28 scientists, 7 technicians and 17 managers and clerical personnel.

State officials estimate that there are currently approximately 400 individuals working in industries throughout the state in air pollution control. The majority are engineers, although scientists and technicians are also utilized. In addition, there are approximately ten consulting firms in the state that service the field.

DHEC appears to be adequately staffed in air to address required functions. Limited growth is expected and while the number of engineers is expected to decrease, the number of technicians and scientists is expected to increase approximately 4% annually. For the private sector, sources project that the number of personnel in industries will increase from 400 to 450 in five years and the number of consulting firms may double.

The greatest problem identified within the Department is the inability to send personnel to technical courses. This is due to EPA tuition charges coupled with state budgetary controls. DHEC's participation in the Southeastern Air Pollution Control Training Committee, developed by the Region IV EPA, assists in providing needed training for personnel.

II. NOISE

Noise control efforts in South Carolina take place in the South Carolina Department of Health and Environmental Control. In relation to environmental noise, the function is largely consultative, as no statewide noise legislation is in effect. DHEC has promoted local noise ordinances, and provides information to local officials for establishing regulations. Consultation is also carried out with industries regarding the control and abatement of environmental noise.

Within DHEC, one person works part-time in environmental noise. A possibility exists that regulatory legislation will be passed within the next five years. A nominal staff of eight would be formed, preferably with six professionals who have had previous experience in the field. Eventually the total staff would increase to 26, with twelve in the headquarters office, and fourteen in the Department's district offices. Sanitarians of County Health Departments would be trained to provide enforcement. Most or all of the state's 46 counties would also probably require noise control officers.

While workforce increases may occur in the public sector and possibly in the private sector, sources indicate that persons with any training and/or experience in the field are not readily available. It may also be that engineers with master's degrees will be in greatest demand, especially those with experience in the field.

III. PESTICIDES

The Division of Regulatory and Public Service Programs of Clemson University implements the State's Pesticide Control Act. Cooperation is received from the Department of Health and Environmental Control, the Cooperative Extension Service and the Aeronautics Commission. Within these agencies are approximately 81 professionals, chiefly from agricultural backgrounds that service the field, most on a part-time basis. In addition, 140 county agents provide training to private applicators.

As of November 1, 1976, approximately 2,158 commercial applicators were certified out of an estimated 3,850 that will require certification by October 21, 1977. On November 1, 754 private applicators had been certified out of an estimated total of 35,000-40,000 requiring certification. The number of pesticide dealers requiring licensing is estimated to be from 1,000 to 2,000.

In the public sector, workforce levels are not expected to increase except in the area of investigation, which would require persons with agricultural backgrounds. The growth rate for commercial applicators is projected to be 5% per year except in the category of Industrial, Institutional, Structural and Health Related Pest Control, which is expected to grow 10% annually. Greater needs are projected for graduate level persons with expertise in the field.

Applicator training is conducted by the Cooperative Extension Service. The training rate will necessarily decline after 1977, but the nature of the training will not be changed.

IV. POTABLE WATER

The South Carolina Safe Drinking Water Act of 1976 is implemented by the Department of Health and Environmental Control (DHEC), which currently employs 40 people for potable water. The state has recently assumed primacy for the Federal Safe Drinking Water Act and as a result, an additional 21 people are projected to be added to the program by 1982, specifically sanitary and environmental engineers, geologists, chemists, biologists and technicians.

The state operates a mandatory certification program for operators of water treatment plants. During 1976, 1,179 certificates were issued to plant operators, three to inspectors, and three to laboratory technicians. Sources predict that there will be 100 technicians by 1982 as well as 4 inspectors and approximately 1,500 plant operators.

Training for plant personnel is available in several forms. Currently available are an associate degree program, an eighty-hour upgrade program, a correspondence course from Clemson University and periodic short schools. While these programs are felt by DHEC officials to provide adequate training, a problem lies in the number of students that can be accommodated. Through available training modes, it is not anticipated that the projected annual new entry training requirements for 50-100 operators and for the upgrade of 200-300 operators can be met. DHEC is also concerned about the lack of technical training currently available to its own potable water personnel.

V. RADIATION

Radiation control functions in South Carolina take place in the Department of Health and Environmental Control (DHEC). South Carolina is heavily impacted with nuclear facilities, which are monitored by DHEC. The Department also licenses materials and machines. Twenty persons in DHEC are involved in radiation control: two nuclear engineers, fifteen health physicists and three secretaries.

Nuclear facilities employ staffs for radiation control, and data indicate that there will be 20 health physicists employed by these facilities in the state, as well as 100 health physics technicians. Sources are aware of two medical facilities that employ radiation physicists. Sources also estimate that 20 radiochemists perform related analytical work in the state.

The DHEC may increase by three health physicists during the next five years. In addition, available data indicate that there may be an increase of five to ten health physicists and 60 to 80 technicians in nuclear facilities and that there may be 10 radiation physicists for medical facilities by 1982. The number of radiochemists is not expected to increase.

Persons trained in these professions are currently not readily available, although there are several curricula in the state for training technicians. Professionals voice the feeling that a great need exists for expansion of institutional training programs for training health physicists, radiation physicists and, to a lesser extent, for radiochemists and nuclear engineers.

VI. SOLID WASTE

The Department of Health and Environmental Control (DHEC) implements South Carolina's solid waste program. This agency will be responsible for carrying out the provisions of the Resource Conservation and Recovery Act of 1976. While 29 persons now work in solid waste in DHEC, this number will of necessity increase. Preliminary projections provide for an increase of ten positions by 1979, and most personnel will continue to be engineers and scientists, many preferably with expertise in hazardous materials and resource recovery.

According to state sources, there are approximately 292 persons in the state involved in solid waste disposal: 232 landfill operators, 4 weighmasters, 39 foremen and 17 spotters. There are no designated hazardous waste disposal facilities and most resource recovery takes place in the private sector. Sources predict that the number of landfill operators will increase by ten during each of the next five years, and numbers of other disposal personnel will increase at a similar rate. Workforce increases in the areas of hazardous waste management and resource recovery cannot yet be accurately predicted.

Technical upgrade opportunities for DHEC solid waste personnel are extremely limited. To partially fill the void, Region IV EPA has formed a solid waste training committee in which DHEC personnel participate. The agency currently carries out informal training for landfill personnel and hopes to develop an operator certification program in the future.

VII. WASTEWATER

The Department of Health and Environmental Control (DHEC) implements South Carolina's wastewater program. Presently approximately 145 persons in DHEC work in wastewater. Officials do not foresee a need for significant workforce increases within the next five years. Engineers, scientists and technicians fill the majority of the positions although technicians may find more job opportunities in the future.

The state implements a mandatory certification program for wastewater treatment plant operators. During 1976, 2,380 certificates were issued to operators of wastewater treatment plants, 15 persons were certified as inspectors and 24 were certified as laboratory technicians. State sources project an annual requirement of 200 entry level operators and, although the majority will continue to be in lower grades, a slight upward shift may occur. Within two years, an estimated 500-600 certified laboratory technicians will be required and the number of inspectors will slightly increase.

A variety of training opportunities is available to plant personnel, including an associate degree program an eighty-hour upgrade program, correspondence courses, short schools and an NPDES training program. Sources believe that these programs offer adequate training but may not be able to accommodate the required number of students. DHEC officials are also concerned that the agency's personnel are not able to attend technical training at the required level because of state budget limitations.

VIII. ENERGY

The South Carolina Energy Management Office is the state's chief coordinating agency in the energy field, and will implement an energy conservation program under the provisions of the Federal Energy Policy and Conservation Act. The office employs a director and eight other professionals including statisticians, engineers and administrative personnel. For implementing the Act, three additional professionals will be required.

A Nuclear Advisory Council is responsible for assuring that the nuclear industry does not have a detrimental effect on the state's citizenry. The Council has eleven members, one of whom is a full-time staff person. One more staff person may be required within the next five years.

Impact of the conservation program is expected to occur in the private sector. Highly skilled architects, engineers and scientists will be required to assist in meeting the mandates of the Act. Few opportunities appear to be emerging for technician level personnel in the field of energy except for those trained in power plant management.

State professionals believe that an important component of energy conservation programs is public awareness and education. Home-owner energy saving workshops have been held throughout the state and plans are underway to provide energy conservation workshops to school children.

STATE OF SOUTH CAROLINA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR [1]	490	505	524	539	558	573	3%
NOISE [2]	1					26	n/a
PESTICIDES [3]	231	232	233	234	235	236	1%
POTABLE WATER [4]	1,225	1,317	1,411	1,496	1,580	1,665	6%
RADIATION [5]	161	179	197	215	242	253	10%
SOLID WASTE [6]	321	338	356	371	384	396	3%
WASTEWATER [7]	2,564	2,989	3,441	3,741	3,943	4,142	10%
ENERGY [8]	10	13	14	14	14	14	7%
TOTALS	5,003	5,575	6,190	6,610	6,956	7,305	8%

[1] Includes the state agency and estimates of the private sector workforce.

[2] Includes the state agency, and is based upon the assumption that statewide noise legislation will be passed. If this occurs, workforce increases would probably occur at the local level and in the private sector.

[3] Includes public agency personnel. Does not include an estimated 3,850 commercial applicators, 35-40,000 private applicators and 1-2,000 dealers. One commercial category (structural) is expected to grow 10% annually, while all others are expected to grow 5% annually.

[4] Includes state personnel and certified inspectors, operators and lab technicians.

[5] Includes the state agency and the estimated workforce of the private sector.

[6] Includes state personnel and disposal personnel.

[7] Includes state personnel and certified operators, lab technicians and inspectors.

[8] Includes the Energy Management Office and the Nuclear Advisory Council. Private sector figures are unavailable, although increased needs are projected for skilled engineers, architects and scientists.

EDUCATION

Clemson University offers a master and doctorate level degree program in Environmental Systems Engineering. This curriculum was first offered in 1961, and programs are offered in the following areas: Water Treatment Systems, Natural Systems, Planning and Management, Environmental Science, Air Pollution and Environmental Systems Engineering.

Sumter Area Technical College offers a two-year curriculum and degree in Environmental Engineering Technology. Courses are offered in such areas as air and water pollution, solid waste, sanitation, industrial waste and water quality and wastewater engineering.

An Associate in Applied Science degree in Chemical Technology is offered by the Greenville Technical College. Students study the fundamentals of inorganic chemicals, the reactions between chemicals and the production of consumable products from other chemicals. An Associate degree in Wastewater Technology is also offered, in which students study ecology, chemistry, unit operations, hydraulics, supervison and government.

Trident Technical College, the Aiken Technical Education Center and the Tri-County Technical Education Center offer two-year curriculums in the nuclear field. Programs are designed to train students to be technicians in the nuclear industry, and among the courses offered is radiological safety.

LEGISLATION

The environmental/energy legislation for South Carolina was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Pollution Control Act of 1970

Pesticide Control Act

State Safe Drinking Water Act

Atomic Energy and Radiation Control Act

Operator Certification Law